SOIL SURVEY OF

Brevard County, Florida

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Florida
Agricultural Experiment Stations

Issued November 1974

Major fieldwork for this soil survey was done in the period 1964–69. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service, the University of Florida Agricultural Experiment Stations. It is part of the technical assistance furnished to the Brevard Soil and Water Conservation District. The Brevard Board of County Commissioners contributed financially to accelerate the completion of fieldwork for the soil survey.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming and ranching, industry, and recreation.

Locating Soils

All the soils of Brevard County are shown on the detailed map at the back of this publication. The map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be devolped by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the descriptions of the capability units and the range sites.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Range and Grazeable Woodland," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Town and Country Planning" and "Soils and Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers to Brevard County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication.

***Cover:* Launch complex on Canaveral-Palm Beach-Welaka association. Soils of this association are poor for farming, but provide a good site for launching facilities.**

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SOIL SURVEY OF BREVARD COUNTY, FLORIDA

BY HORACE F. HUCKLE, HERSHEL D. DOLLAR, AND ROBERT F. PENDLETON,[1] SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UNIVERSITY OF FLORIDA AGRICULTURAL EXPERIMENT STATIONS

BREVARD COUNTY is on the Atlantic Coast near the middle of the Florida Peninsula (fig. 1). It is bordered on the north by Volusia County, on the west by Osceola, Orange, and Volusia Counties, on the south by Indian River County, and on the east by the Atlantic Ocean. Cape Kennedy forms the central part of the Atlantic coast line of Brevard County. The cape is conspicuous in that it breaks the relatively smooth line of Florida's east coast.

The land area within the county is 660,480 acres, or 1,032 square miles. Freshwater lakes cover about 12,550 acres, and salt water about 159,245 acres. The county is about 72 miles long and about 25 miles wide. Titusville, the county seat, is in the northern part of the county near the Indian River. Approximate distances by air from Titusville to the principal cities in the State are shown in figure 1.

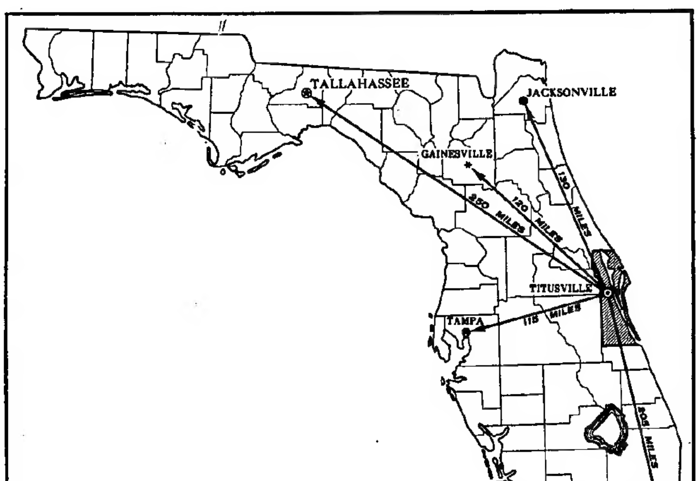

Figure 1.—Location of Brevard County in Florida.

Brevard County is on the coastal lowlands of Florida (*7*).[2] The principal features are the St. Johns River Valley, the Atlantic Coastal Ridge, and the Barrier Islands. The St. Johns River Valley includes all of the area west of the Atlantic Coastal Ridge. The source of the St. Johns River is the marsh area in the southern part of the county. The river forms a definite channel where it leaves Lake Hellen Blazes. It then passes through Sawgrass Lake, Lake Washington, Lake Winder, and Lake Poinsett. From Lake Poinsett it flows along the western border of the county until it reaches a point west of Titusville, where it flows out of the county and continues flowing northward until it discharges into the Atlantic Ocean near Jacksonville.

The St. Johns River Valley is made up of marsh, sandy prairie, and flatwoods.

Much of the land immediately adjacent to the river is marsh and is covered with water when the river is at flood stage. The marsh ranges from less than 1 mile to more than 7 miles in width. It is less than 25 feet above sea level. The vegetation is mainly marsh grasses and a few palm hammocks and clusters of cypress trees.

The sandy prairie borders the marsh in some places and is as much as several miles wide. It, too, is part of the St. Johns River flood plain and is flooded frequently. The vegetation is mainly grasses, saw-palmetto, many low shrubs, and a few cabbage palm hammocks.

The pine and palmetto flatwoods lie between the prairie and the Atlantic Coastal Ridge. The prairie and forest areas are less than a mile to more than 12 miles wide. In some places the flatwoods area borders the marsh. The flatwoods is nearly level and poorly drained. There are numerous scattered intermittent ponds, lakes, swamps, and sloughs. The altitude east of the St. Johns River ranges from a few feet above sea level along the border of the marsh to about 35 feet above sea level. Other areas of flatwoods, in the southwest corner of the county, rise to an elevation of about 52 feet. The vegetation is mostly pine, saw-palmetto, and wiregrasses.

The Atlantic Coastal Ridge is bordered on the west by the flatwoods and on the east by the Indian River. It extends the entire length of the county and is 1½ to 3 miles wide. The landscape is one of parallel, north-south, elongated ridges and intervening swales. In the swales are many shallow ponds, lakes, and long narrow sloughs. The ridge ranges from sea level to an elevation

[1] Others participating in the field survey were W. D. BARNDT, D. L. COBB, O. E. CRUZ, A. L. FURMAN, A. HYDE, L. LAW, JR., D. E. PETTRY, E. H. RAWLS, J. L. SULLIVAN, and H. O. WHITE, Soil Conservation Service.

[2] Italic numbers in parentheses refer to Literature Cited, p. 121.

of 55 feet, the highest in the county. Its crest forms the natural drainage divide between the St. Johns River and the Indian River basins. A series of small streams flow eastward out of the ridge into the Indian River. The western slope is drained by a series of small interconnecting depressions that channel water westward into the St. Johns River. The vegetation is mainly saw-palmetto, sand pine, scrub oak, and shrubs.

The Barrier Islands are separated from the mainland by the Indian River and are bordered on the east by the Atlantic Ocean. They are made up of relict beach ridges formed by the action of wind and waves along the shore. The main ridge is a few hundred feet to a mile wide. Cape Kennedy is about 4½ miles wide, and Merritt Island is about 7 miles wide. The islands range from sea level along the shore to an elevation of 20 feet along the crest of the dune ridges. The vegetation is the kind that thrives in saline soil and air, most commonly sea oats, saw-palmetto, sea grape, cocoa plum, wax myrtle, lantana, and bay cedar.

Brevard County is an urban and specialized farming area. Centers of population are along the Indian River on the mainland, on South Merritt Island, and on the Atlantic barrier beaches. The Cape Kennedy Air Force Station is located on Canaveral Peninsula, and the John F. Kennedy Space Center is on North Merritt Island. The main crops are citrus and forage grasses. Commercial beef raising is important in the county. A few vegetables and subtropical fruits are grown. A humid, temperate climate prevails. Rainfall is abundant and is more plentiful in summer than in other seasons.

Environmental Factors Affecting Soil Use

This section describes the chief natural and cultural features that affect the use and management of the soils in Brevard County.

Cultural Features

From the time of discovery in 1513 to more than 300 years later the area that is now Brevard County was practically a wilderness, occupied mostly by Indians, shipwrecked sailors, and a few Spanish friars.

In 1818, Colonel Thomas Dummitt became the first settler. The citrus grove he established is considered to be the nation's oldest commercial grove. Another early settler was Captain Miles O. Burnham who was the first lighthouse keeper on the Cape.

The first record of any real settlement in the county was in 1856, when 30 to 40 families formed the community of Canaveral, just about where the City of Cape Canaveral is now. Early settlements were along the east coast near rivers, where population growth and urban development are still concentrated.

Early settlement of Brevard County was slow. The 1850 census showed a population of 139. Economic growth began in the 80's with regular steamer service on the Indian River.

Rapid growth in population occurred after World War II when the long-range missile program was moved to Cape Canaveral and the Cape was selected as a launching facility for the exploration of space, and again in 1963 when 88,000 acres on North Merritt Island became the John F. Kennedy Space Center under the National Aeronautics and Space Administration. In 1950, the population was 23,653; in 1960, it had increased to 111,435, and in 1970, it totaled 224,367.

Since the beginning of the space program industrial employment in the county has increased greatly. Precision instruments, electrical machinery, and transportation equipment are manufactured. Food products, fabricated metals, and a little lumber and furniture are other products. Large numbers are employed in construction, and many more are employed by the space program. The number employed in agricultural enterprise has increased in the last few years, but the percentage of total population employed in agriculture has decreased during the same period.

Commercial fishing is important to the economy of the county. In 1968 more than two million pounds of food fish were landed in the county and almost two and a half million pounds of shell fish. A shrimp fleet docks at Port Canaveral.

Community facilities have expanded rapidly since the beginning of the space program and the expansion of the several urban centers. All parts of the county are adequately served by electric and telephone facilities. Natural gas is available in many places.

Recreational activities are mostly centered around the many miles of coastal beaches and large expanses of inland waters in the Indian and Banana Rivers, the St. Johns River, and large freshwater lakes. The beaches attract many visitors, and surfing is popular. Boating, water skiing, and fishing are common activities on the Indian and Banana Rivers. Deep sea fishing is popular on the ocean. Recreational parks that have facilities for swimming, picnicking, and camping are scattered about the county. Horseback riding is popular.

Most of Brevard County is served by good transportation facilities. Several county, State, and Federal highways provide ready access between population centers within the county and the State. The mainland is connected to Merritt Island and the beaches by a modern system of bridges. Airline service is available in Melbourne, Titusville, and Cocoa. Rail and bus service are available between most cities in the county. The Intracoastal Waterway provides a water route through the county via the Indian River and the Indian River Lagoon. Port Canaveral is a deepwater port where naval ships and commercial freighters dock and load and unload cargos.

Climate [3]

The climate in Brevard County is characterized by long, relatively humid summers and mild winters. Rainfall is heaviest in summer. About 65 percent of the annual total falls from June through October in an average year. The other 35 percent is more or less evenly distributed throughout the rest of the year.

Temperatures in both summer and winter are moderated by the waters of the Indian and Banana Rivers

[3] FRANKLIN NEWHALL, climatologist, Soil Conservation Service, helped prepare this section.

and the Atlantic Ocean. Maximum temperatures in summer show little day to day variation, and temperatures as high as 95° F. are not common. Minimum temperatures in winter vary considerably from day to day, largely because periodic invasions of cold, dry air move southward from across the continent. Summarized temperature and precipitation data, based on about 10 years of record from Titusville, are shown in table 1. Extreme temperatures during this period were a high of 102° and a low of 23° F.

In many areas, particularly near the water, temperatures seldom drop below freezing. Important farming is carried on in many local areas where freezing temperatures occur at least once each winter and on an average of five to ten times per year. Temperatures drop to 28° or lower in the cold areas about three times in an average winter. Table 2 shows the probability of the first and last freezing temperatures based on observations at Cocoa. The average date of the first freeze is December 30, and the last is January 27.

Table 1.—*Temperature and precipitation*

[All data from Titusville. Elevation 15 feet]

Month	Temperature			Average number of days with temperature—		Precipitation			Average number of days with rainfall of—	
	Average daily	Average daily maximum	Average daily minimum	90° F. or more	32° F. or lower	Average total	One year in 10 will have— Less than—	One year in 10 will have— More than—	0.10 inch or more	0.50 inch or more
	°F.	°F.	°F.			Inches	Inches	Inches		
January	60.3	72.4	48.2	0	2	1.87	0.1	5.1	4	2
February	62.9	74.7	51.0	0	1	2.36	1.3	4.1	5	2
March	65.8	78.0	53.6	1	(1)	3.66	.2	9.0	6	3
April	70.9	82.4	59.4	2	0	3.42	1.7	6.5	5	3
May	76.3	87.6	65.0	9	0	3.18	.7	7.5	6	2
June	79.9	90.8	68.9	20	0	7.73	3.4	8.4	10	4
July	81.3	91.9	70.7	26	0	7.67	5.9	14.4	13	5
August	81.7	91.9	71.4	26	0	6.95	2.3	19.8	9	5
September	80.1	88.9	71.1	14	0	8.75	3.6	16.0	12	6
October	74.0	83.3	64.9	3	0	6.18	3.2	13.7	8	5
November	67.3	78.0	56.6	0	(1)	2.18	.5	5.2	3	1
December	61.5	73.0	49.9	0	1	2.01	.5	4.3	4	1
Year	71.8	82.7	60.9	101	4	55.96	43.7	81.7	85	39

[1] Less than 1 day.

Table 2.—*Probabilities of first freezing temperatures in fall and last in spring*

[All data obtained from records at Cocoa. Elevation 25 feet]

Probability	Dates for given probability at a temperature of 32° F. or lower
Fall:	
1 year in 10 earlier than	November 30.
2 years in 10 earlier than	December 13.
5 years in 10 yearlier than	December 30.
Spring:	
1 year in 10 later than	March 7.
2 years in 10 later than	March 2.
5 years in 10 later than	January 27.

Most rainfall in summer occurs as afternoon and evening showers and thundershowers; sometimes 2 or 3 inches falls within an hour or two. Day-long rains in summer are rare. Generally they are associated with tropical storms. Rainfall in fall, winter, and spring is seldom as intense as in summer. Rainfall in excess of 8 inches during a 24-hour period can be expected sometime during the year in about 1 year in 25.

Hail falls occasionally during thunderstorms, but hailstones are usually small and seldom cause much damage. Snow is rare in Brevard County; when it occurs, it melts as it hits the ground.

Tropical storms can affect the area any time from early in June through mid-November. The changes of winds reaching hurricane force, 74 miles per hour or greater, in Brevard County in any given year are about 1 in 20. The copious rains and the flooding associated with these storms can cause considerable damage.

Extended periods of dry weather can occur in any season, but are most common in spring and fall. Dry periods in April and May are generally of shorter duration than those in fall, but tend to be more serious. Temperatures are higher, and the need for moisture is greater.

Prevailing winds are generally from the north and east, except in March, when southerly winds prevail. Windspeeds are usually between 10 and 15 miles per hour in the afternoon, and 5 and 10 miles per hour at night.

Farming

Oranges were among the first crops grown by the early settlers. In 1818, Captain Thomas Dummitt brought orange trees from the northern part of Florida to the northern end of Merritt Island and grafted the imported trees to wild sour orange trees growing in the area. Citrus became the major farm crop.

According to the Conservation Needs Inventory, about 24,500 acres in the county in 1968 was in citrus groves. About 16,500 acres was in oranges, 3,250 in grapefruit, and the rest in tangerines, temples, tangelos, lemons, and limes. Between 1959 and 1964 the acreage planted to citrus increased about 28 percent.

Tomatoes have been grown in scattered areas throughout the county, but mostly in the southern part. A few are still grown occasionally, but not to the extent of past years. A very small acreage is occasionally planted to other vegetable crops, but not on a commercial scale. About 40 acres of strawberries is planted yearly.

A few plantings of mangos and avocados are on the southern part of Merritt Island. Ornamental nursery operations have increased to furnish landscaping materials to an expanding urban community.

Beef production, a cow-calf type of operation, is a major enterprise, second only to citrus. About 400,000 beef cattle, mostly Brahman and Black Angus, were in the county in 1968. They graze about 60,000 acres of improved pasture and 150,000 acres of range. The county has only two dairies.

Water

Large quantities of surface water are available at many places in Brevard County. The St. Johns River throughout its length is a potential source of water for municipal, industrial, and agricultural supplies. The lakes through which the river flows are natural reservoirs that have large storage capacities.

The analysis of water from the St. Johns River shows that the river is low in mineral content, but fairly high in color at the source. The hardness, chloride content, and dissolved solids generally increase downstream from the source.

The streams that flow eastward out of the Atlantic Coastal Ridge into the Indian River continue to flow, even during periods of low rainfall. The analysis of water from these streams indicates that several have potential for water-supply development. The lakes and sloughs in the Atlantic Coastal Ridge area also can be used to provide water supplies.

Ground water is the subsurface water in the zone of saturation; that is, the zone in which all pore spaces are filled with water under pressure no greater than atmospheric pressure. Ground water is derived almost entirely from local precipitation.

Nonartesian water occurs in the sediments of Pleistocene and Recent age. These sediments are about 50 feet thick in the Atlantic Coastal Ridge, but are less than 20 feet thick in the vicinity of the St. Johns River. About 40 feet of these sediments is saturated with ground water in the Atlantic Coastal Ridge area, but the zone of unsaturation thins toward the St. Johns and Indian Rivers, and ground water is at or near the surface most of the time. The lower part of the sediments contains saline water in some places.

The quality of nonartesian water is generally superior to that of artesian water. The high chloride content and hardness of some nonartesian water result, at least in part, from contamination by upward-flowing artesian water. The chemical composition of nonartesian water is such that the water generally is suitable for all purposes. Removing the iron and color and reducing the hardness, however, generally are desirable when the water is used for domestic purposes. The nonartesian aquifer in the Atlantic Coastal Ridge is the source of supply for several municipalities and hundreds of privately owned wells.

Any large water supply taken from a nonartesian aquifer lowers the water table and either increases the upward flow of artesian water into the nonartesian aquifer, if such flow is occurring, or causes an upward flow in areas where the flow is now downward.

The source of the largest supply of artesian water in Brevard County is the Floridan aquifer, which consists of limestone formations of Eocene age and permeable beds in the basal part of the Hawthorne Formation of Miocene age. The top of the aquifer is about 75 feet below sea level in the northwestern part of the county and more than 300 feet below sea level in the southeastern part.

The chloride content of artesian water in the county ranges from about 32 to 14,500 parts per million. In general, the quality of the artesian water is unsuitable for public drinking, except in a small area in the southeastern corner of the county and in two small local areas of recharge near Titusville. The chloride concentration is highest in the central part of the county.

The Floridan aquifer is the main source of water for irrigation. Many scattered artesian wells occur throughout the county. Generally, artesian water from wells on Merritt Island and the low marine terrace east of Mims has such a high chloride content that it is not suitable for irrigation.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Brevard County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Felda and Myakka, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, St. Lucie fine sand, 0 to 5 percent slopes, is one of several phases within the St. Lucie series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Brevard County: the soil complex and the undifferentiated group.

Sometimes soils are observed that are closely related to a soil series, but depart from it in at least one differentiating characteristic and are of too small an extent to justify establishing a new series. These soils are called soil variants and take the name of the closely related series, but are modified by the principal distinguishing feature. For example, Parkwood fine sand, moderately fine subsoil variant, is the name of one soil variant in Brevard County. A soil may be recognized and defined as a variant in one survey area and later be designated as a separate series if found to be of important extent.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen, for example, Myakka-Urban land complex.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Floridana, Chobee, and Felda soils, flooded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Coastal beaches is a land type in Brevard County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing medium for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to slow permeability or a high water table. They see that streets, road pavements, and foundations for houses crack on a given kind of soil, and they relate this failure to a high shrink-swell potential. Thus, they use observation and knowledge of soil properties, together with available research data, to predict the limitations or suitability of a soil for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their study and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Brevard County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a

road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The 12 soil associations in this survey have been grouped into six general kinds of landscapes for broad interpretative purposes. All are described on the pages that follow.

Soils of the Sand Ridges

The two soil associations in this group consist of excessively drained to moderately well drained, nearly level to strongly sloping soils that are sandy to a depth of 80 inches or more. They are on ridges along the Indian River on the mainland, on Merritt Island, and on the Atlantic Coastal Ridge.

1. Paola-Pomello-Astatula association

Nearly level to strongly sloping, excessively drained and moderately well drained soils, sandy throughout

This association is made up of undulating sandhills interspersed with small areas of flatwoods, grassy sloughs, and isolated wet depressions. The most extensive area is a long, narrow ridge on the mainland, roughly parallel to the Indian River. It extends the length of the county, from north to south, and in most places is less than 2 miles wide. A few wider areas are near Melbourne and Titusville. Smaller areas of this association are in the southern part on Merritt Island, between the Indian and Banana Rivers, and in the northern part, between the Indian River and the Indian River Lagoon. Most areas are nearly level to gently sloping, but some areas west and south of Titusville have broken topography and are steeper. In the sandhills the natural vegetation (fig. 2) is sand pine, scrub live oak, turkey oak, scattered saw-palmetto, runner oak, grasses, and rosemary; in the flatwoods it is saw-palmetto, slash pine, longleaf pine, and pineland three-awn, or wiregrass; and in the sloughs and wet depressions, wetland grasses, sedges, and flags.

This association makes up about 40,100 acres, or a little less than 6 percent of the land area in the county. It is about 23 percent Paola soils, 17 percent Pomello soils, 14 percent Astatula soils, and 46 percent soils of minor extent. The major soils are sandy and are more than 80 inches deep. Some of the minor soils have coquina rock within a depth of 50 inches.

Figure 2.—**Sand pine, scrub live oak, and scattered saw-palmetto on Paola-Pomello-Astatula association. The soil is Paola fine sand, 0 to 5 percent slopes.**

Paola soils are excessively drained and have a dark-gray surface layer, a light-gray subsurface layer, and a brownish subsoil.

Pomello soils are light colored and moderately well drained and have a black and dark reddish-brown, weakly cemented layer below a depth of 30 inches. In wet weather the water table rises to within a depth of 40 to 60 inches.

Astatula soils are sandy, yellowish to brownish, and excessively drained.

Minor in this association are St. Lucie, Orsino, Cocoa, Myakka, Immokalee, Anclote, and Terra Ceia soils; Quartzipsamments, smoothed; and Urban land.

A large part of this association has been cleared and planted to citrus, but some of this has since been abandoned. For most part, the soils are too droughty and too low in fertility to be more than poorly suited to vegetable crops. They are of only limited use for pasture, range, and woodland. They do, however, provide protection and a limited supply of food for wildlife. Much of the urban development in the county is on this soil association.

Limitations are only slight to moderate for residential and light industrial development if a community sewage disposal system is available. Limitations are only slight to moderate for septic tank absorption fields, but the hazard of contaminating ground water is severe. Limitations are severe for unpaved streets and roads, but only slight for all-weather surfaced roads and streets. Limitations are severe for recreational development.

2. *Canaveral-Palm Beach-Welaka association*

Nearly level to gently sloping, moderately well drained to excessively drained soils, sandy throughout

This association is made up of nearly level and gently sloping ridges interspersed with narrow wet sloughs that generally parallel the ridges. It is along the coast near the Atlantic Ocean and extends the entire length of the county. The largest area is Canaveral Peninsula. The natural vegetation is saw-palmetto, scrub live oak, runner oak, cactus, and sea grape. Australian pines have been planted in places for windbreaks.

This association makes up about 31,400 acres, or slightly less than 5 percent of the land area in the county. It is about 37 percent Canaveral soils, 17 percent Palm Beach soils, 9 percent Welaka soils, and 37 percent soils of minor extent.

Canaveral soils are on moderately low ridges. They consist of a mixture of light-colored quartz sand grains and multicolored shell fragments. They are moderately well drained.

Palm Beach soils are similar to Canaveral soils, but are excessively drained. They are on higher ridges and have a lower water table. They commonly are in areas between Port Canaveral and Melbourne Beach.

Welaka soils have a light-colored subsurface layer and a yellowish subsoil. The subsoil extends to a depth of 40 to 60 inches. Below this is a mixture of quartz sand and shell fragments.

Minor in this association are the Myakka, Pomello, and Parkwood soils, Coastal beaches, and poorly drained soils in sloughs.

The major soils in this association are droughty, even though in some areas the water table is near the surface during rainy periods. The soils are very poor for farming. Only a few areas in the southern part of the county are in citrus. Pine trees do not grow well in most areas. The thick growth of saw-palmetto and scrub oak, however, makes good cover for wildlife, particularly deer. Clearing and leveling for urban uses has been extensive on this association between Port Canaveral and Melbourne Beach. All of the missile launch complexes and support facilities of Cape Kennedy Air Force Station are on this association.

Limitations are slight to moderate for residential and light industrial developments. Limitations are slight to moderate for septic tank absorption fields, but this use could contaminate the ground water. Limitations are slight to moderate for all-weather surfaced local roads and streets. The loose sand is a severe limitation for recreational developments and for unpaved streets and roads.

Soils of the Broad Grassy Flats

The one soil association on broad grassy flats consists of poorly drained, nearly level soils that are sandy to a depth of 80 inches or more. This association is on the mainland, mainly between Titusville and Melbourne at the eastern edge of the lowlands along the St. Johns River.

3. *Pompano association*

Nearly level, poorly drained soils, sandy throughout

This association is made up of broad grassy flats interspersed with low flatwood knolls, low depressions, and small hardwood swamps. It is on the mainland east of the St. Johns River in an area extending from west of Palm Shores to west of Ti-Co Airport. The largest area is south of Rockledge. The natural vegetation is mostly marsh cordgrass and scattered cabbage palms and a few pines on the broad flats; pines, saw-palmetto, and pineland three-awn on the low flatwoods knolls; and wetland grasses and sedges in the depressions and mixed hardwoods in the swamps.

This association makes up about 12,900 acres, or slightly less than 2 percent of the land area in the county. It is about 77 percent Pompano soils and about 23 percent soils of minor extent.

Pompano soils have a very dark brown and dark-gray surface layer and brownish or grayish sandy material to a depth of 90 inches or more. These soils are poorly drained.

Minor in this association are the Myakka, Valkaria, and Anclote soils and Swamp.

About half of this association has been cleared and is now in improved pasture. A large acreage is still in natural vegetation, some of which is used for range. Some areas have been subdivided into lots, but very few houses have been built.

A high water table is a severe limitation for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, and all-weather surfaced roads and streets. Limitations are severe for rec-

reational development because in most areas the water table is at or near the surface at times of peak use.

Soils of the Flatwoods

The two soil associations in this group consist of poorly drained, nearly level sandy soils over dark-colored, weakly cemented sandy layers that are underlain by sandy or loamy material. These associations are on the mainland, generally between the coastal ridge and the lowlands along the St. Johns River, and on Merritt Island. They are interspersed with grassy sloughs, ponds, and swamps.

4. Myakka-EauGallie-Immokalee association

Nearly level, poorly drained soils, sandy throughout, or sandy to a depth of 40 inches and loamy below

This association is made up of nearly level pine and palmetto flatwoods interspersed with low scrub oak ridges, small to large grassy ponds and sloughs, and swamps. It is extensive on the mainland and Merritt Island. The natural vegetation in the flatwoods is mainly pine trees, saw-palmetto, and pineland three-awn (fig. 3). In some places it is a mixture of cabbage palms and pines. The low ridges, where the vegetation is scrub oaks, pine-land three-awn, and scattered pines, are more numerous near the Indian River. Common vegetation in sloughs is sand cordgrass, maidencane, and sawgrass. In the intermittent ponds St.-Johnswort is common. Many sloughs and intermittent ponds are bordered with cabbage palms, and in some places scattered cabbage palms are growing in the sloughs. Cypress trees and mixed hardwoods are in swamps.

This association makes up about 255,300 acres, or about 39 percent of the county. It is about 27 percent Myakka soils, about 17 percent EauGallie soils, about 13 percent Immokalee soils, and about 43 percent soils of minor extent.

Myakka soils have a grayish sandy surface layer and subsurface layer and a dark-colored, weakly cemented layer that begins within a depth of 30 inches. Below this is sandy material to a depth of 63 inches or more. These soils are poorly drained.

EauGallie soils are similar to Myakka soils and are also poorly drained, but they have loamy layers that begin between depths of 40 and 60 inches. These loamy layers are below the dark-colored, weakly cemented layer.

Figure 3.—Pines, saw-palmetto, and pineland three-awn (wiregrass) in a flatwoods area of the Myakka-EauGallie-Immokalee association. The soil is nearly level Myakka sand.

Immokalee soils are similar to Myakka soils, but the dark-colored weakly cemented layer begins at a depth of more than 30 inches. These soils are poorly drained.

Minor in this association are the Pomello, Basinger, Anclote, Wabasso, St. Johns, Oldsmar, Felda, and Holopaw soils.

Large areas of this association are still in natural vegetation. The original pines have been harvested, and most of the woodland is now second growth. Many areas are used for range, and a few areas are in improved pasture. A few are in citrus groves. Development for urban uses has been moderately extensive. Many kinds of native birds and animals live on the broad expanse of the open, undeveloped areas.

Limitations are severe for all residential and light industrial developments because the water table is high. The high water table also causes severe limitations for septic tank absorption fields, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments.

5. Pineda-Wabasso association

Nearly level, poorly drained soils, sandy to within a depth of 20 to 40 inches and loamy below

This association is made up of nearly level flatwoods, palm hammocks, large to small sloughs and depressions, and in places, scattered intermittent ponds. It is on the mainland near the river flood plain, mostly in the southern half of the county. A few areas are in the northern part. The natural vegetation is a mixture of cabbage palms and pines on the palm hammocks; pines, pineland three-awn, saw-palmetto, and scattered palms on the flatwoods; and sand cordgrass and other wetland grasses and plants in the depressions and sloughs. A few cypress and hardwoods are growing in places.

This association makes up about 65,800 acres, or slightly less than 10 percent of the land area in the county. It is about 35 percent Pineda soils, about 15 percent Wabasso soils, and about 50 percent soils of minor extent.

Pineda soils have a black and dark-gray sandy surface layer and a brownish sandy layer within a depth of 30 inches. Loamy material is at a depth of 20 to 40 inches.

Wabasso soils have a black or very dark gray sandy surface layer, a dark-colored, weakly cemented sandy layer within a depth of 30 inches, and loamy material within a depth of 40 inches.

Minor in this association are the EauGallie, Floridana, Malabar, Oldsmar, Myakka, and Felda soils. Any one of these soils is only 10 percent or less of the association.

Large areas of this association are still in natural vegetation, but the original pines have been harvested and most of the woodland is second growth. A large part of the woodland is used as range or grazeable woodland. Moderately large areas have been planted to improved pastures. A small area west of Micco has been planted to citrus. Many kinds of native birds and animals live in the broad expanses of open, undeveloped areas.

Limitations are severe for residential and light industrial developments, septic tank absorption fields, unpaved local roads and streets, all-weather surfaced local roads and streets, and recreational developments, because the high water table rises close to the surface.

Soils of the Hammocks and Low Ridges

The two soil associations in this group consist of poorly drained and very poorly drained, nearly level soils in hammocks and on low ridges. Some of these soils have a loamy subsoil, some contain dark-colored, weakly cemented layers, and some are less than 40 inches deep over hard limestone. These associations are on low marine terraces north of Titusville and near Valkaria on the mainland and in areas near Courtenay and Orsino on Merritt Island.

6. Myakka-Bradenton, shallow variant-Copeland association

Nearly level, poorly drained and very poorly drained soils, some sandy throughout and others sandy to a depth of less than 20 inches and loamy below

This association is made up of nearly level, low sandy ridges and small-to-large hammocks that are underlain by limestone. The largest area is on the low marine terrace north of Titusville and east of U.S. Highway No. 1, on the mainland. A small area is near Valkaria. The natural vegetation is mixed pines, cabbage palms, and hardwoods, such as live oak, magnolia, bay, and sweetgum.

This association makes up about 7,100 acres, or slightly more than 1 percent of the land area in the county. It is about 25 percent Myakka soils, 20 percent the Bradenton shallow variant, 15 percent Copeland soils, and 40 percent soils of minor extent.

Myakka soils are at the highest elevations. They have a grayish, sandy surface layer and subsurface layer and a dark-colored, weakly cemented layer within 30 inches of the surface. Below this they are sandy to a depth of 63 inches or more. Typically these soils are poorly drained. Artificial drainage is provided in most areas.

Bradenton soils, shallow variant, are also poorly drained. They have a fine sandy surface layer and subsurface layer less than 20 inches thick and a sandy clay loam subsoil. Below the subsoil, generally within a depth of 40 inches, is hard limestone.

Copeland soils have a dark-colored, sandy surface layer and a loamy subsoil. Hard limestone is within a depth of 40 inches. Typically, these soils are very poorly drained. Some artificial drainage is provided in most areas.

Minor in this association are Felda, Pompano, and Wabasso soils and Tidal marsh, each of which makes up no more than 10 percent of the association.

Only small scattered areas of this association are still in native woodland. About 80 percent of the acreage has been cleared and planted to citrus. A few small areas are in pasture used for grazing horses. Small animals, especially rabbits, are plentiful.

Limitations are severe for residential and light industrial development, mainly because the water table is high. The high water table and, in places, the shallowness of the soils over rock are severe limitations for septic tank absorption fields. The water table and excessive wetness are severe limitations for unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments.

7. Copeland-Wabasso association

Nearly level, very poorly drained and poorly drained soils, sandy to a depth of less than 40 inches and loamy below

This soil association is made up mostly of hammocks. It is in the central part of Merritt Island. The natural vegetation is a thick growth of cabbage palms and hardwoods, such as live oak, magnolia, bay, and sweetgum, and a few pines.

This association makes up about 8,500 acres, or a little more than 1 percent of the county. It is about 40 percent Copeland soils, 12 percent Wabasso soils, and 48 percent soils of minor extent.

Copeland soils have a thick, black surface layer and a loamy subsoil overlying marl and hard limestone. Typically, these soils are very poorly drained. The drainage provided in most areas has lowered the water table.

Wabasso soils have a sand surface layer and dark-colored, weakly cemented layers overlying loamy material. Typically, they are poorly drained. Artificial drainage is provided in most areas.

Minor in this association are the Anclote, Bradenton shallow variant, Chobee, Parkwood, St. Johns, and Winder soils.

Only small scattered areas of this association are still in natural vegetation. About 85 percent of the acreage has been cleared and planted to citrus, but some groves have been abandoned and the vegetation now is palm trees. Citrus groves are drained, and most are bedded. Small animals, especially rabbits, are plentiful.

Limitations are severe for residential and light industrial development, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments, mainly because the water table is high. The high water table and, in places, the shallowness of the soils over rock are severe limitations for septic tank absorption fields.

Soils of the St. Johns River Flood Plains

The two soil associations in this group consist of poorly drained and very poorly drained, nearly level soils that have a loamy subsoil. These associations are on lowlands along the St. Johns River, on the mainland.

8. Felda-Floridana-Winder association

Nearly level, poorly drained and very poorly drained soils, sandy to a depth of less than 40 inches and loamy below

This association is made up mostly of broad, low areas interspersed with depressions and swamps and a few, scattered, low knolls. It is on the mainland, on the flood plain along the St. Johns River. The natural vegetation is sand cordgrass and scattered cabbage palms or clumps of palms on the broad flats; wetland grasses, flags, and lilies in the depressions; cypress or mixed cypress and hardwoods in the swamps; and scattered pines, saw-palmetto, palm, and pineland three-awn (wiregrass) on the slightly higher knolls.

This association makes up about 96,100 acres, or a little more than 14 percent of the land area in the county. It is 34 percent Felda soils, 17 percent Floridana soils, 9 percent Winder soils, and 40 percent soils of minor extent.

Felda soils have a sandy surface layer and subsurface layer, 20 to 40 inches thick, and a loamy subsoil. They are poorly drained.

Floridana soils are in depressions and swamps. They are similar to Felda soils, but they have a thick, dark-colored surface layer. They are very poorly drained.

Winder soils have a very dark gray and dark-gray loamy sand surface layer and subsurface layer, and a loamy subsoil within a depth of 20 inches. Calcareous sandy clay loam is generally below the subsoil. These soils are poorly drained.

Minor in this association are the Pineda, Anclote, Wabasso, Terra Ceia, Malabar, Chobee, and Holopaw soils and Swamp. Any one of these soils seldom makes up more than 6 percent of this association.

A large part of this association is in improved pasture and native pasture. Most other areas are used for range. If drainage is adequate, citrus can be grown on most of these soils. Most areas, however, are subject to frequent frost damage. This is a natural habitat for many kinds of birds and wild animals.

Limitations are severe for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments because the high water table is close to the surface and the soils are subject to flooding.

9. Floridana-Chobee-Felda association

Nearly level, poorly drained and very poorly drained soils, some loamy throughout and others sandy to a depth of 20 to 40 inches and loamy below

This association is made up of low, first river bottoms that flood frequently. It is interspersed with shallow river channels. It is on the mainland along the St. Johns River and extends from southwest of Titusville north along the river almost to the county line. The natural vegetation is sand cordgrass and a very few scattered cabbage palms and small cabbage palm hammocks.

This association makes up about 7,280 acres, or slightly more than 1 percent of the land area in the county. It is 35 percent Floridana soils, 27 percent Chobee soils, 27 percent Felda soils, and 11 percent soils of minor extent.

Floridana soils have a thick dark-colored surface layer and a loamy subsoil at a depth of 20 to 40 inches. They are very poorly drained.

Chobee soils also are very poorly drained and have a thick, dark-colored surface layer. A loamy subsoil is within a depth of 20 inches and generally is underlain by calcareous sandy clay loam.

Felda soils have a sandy surface layer and subsurface layer and a loamy subsoil at a depth of 20 to 40 inches. They are poorly drained.

Minor in this association are river channels and shallow lakes.

This association is still in natural vegetation. Except when flooded, some of it is used for range or native pasture. It is too wet for pine trees. Water birds, such as cranes and herons, are common and ducks are common in winter.

Limitations are severe for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments because the water table is high and the soils are frequently flooded.

Soils of the Swamps and Marshes and Very Wet Areas

The three soil associations in this group consist of broad expanses of organic soils, freshwater swamps, tidal marshes, and tidal swamps. They are on the mainland, on the flood plain along the St. Johns River and along saltwater rivers, creeks, and lagoons.

10. Montverde-Micco-Tomoka association

Nearly level, very poorly drained, organic soils, sandy and loamy material at a depth of more than 52 inches for some and within a depth of 16 to 40 inches for others

This association is made up of nearly level peat and muck soils and scattered lakes along the St. Johns River. It is on the mainland, and most is on the flood plain. A few small areas are in other parts of the mainland. The natural vegetation is sawgrass, maidencane, flags, sedges, and scattered to thick stands of woody button bushes. A few areas outside the river basin are covered with mixed hardwoods, mainly maple.

This association makes up about 91,800 acres, or slightly less than 14 percent of the county. It is 30 percent Montverde soils, 23 percent Micco soils, 21 percent Tomoka soils, 14 percent soils of minor extent, and 12 percent open fresh water.

Montverde soils are mainly south of Lake Washington. They are black or dark reddish-brown, partly decomposed fibrous peat to a depth of 52 inches or more. They are very poorly drained and are frequently flooded for long periods.

Micco soils are mainly south of Lake Washington. They also are very poorly drained. They are peat soils like the Montverde soils, but the peat is only 16 to about 40 inches thick. Beneath the peat are thin sandy layers underlain by loamy material within a depth of 50 inches.

Tomoka soils are north of Lake Washington. They consist of black or dark reddish-brown muck 16 to about 40 inches thick. Beneath the muck are sandy and loamy layers within a depth of 50 inches of the organic surface.

Minor in this association are the Terra Ceia, Felda, and Canova soils. Also in this association are Lakes Poinsett, Winder, Washington, Hellen Blazes, and Sawgrass and the St. Johns River channel. The river flows through these lakes.

Most areas of this association are still in natural vegetation and are used for range. A relatively small part has been diked and ditched and developed for improved pasture. A few places are used for vegetable crops. Many water birds, such as cranes and herons, are in some areas. Ducks frequent the large canals and ditches.

Limitations are very severe for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments, because the soils are very wet, they are frequently flooded for long periods, and the muck and peat have very low bearing capacity. The peat must be removed and backfilled with suitable material if areas of this association are to be used.

11. Swamp association

Nearly level, poorly drained and very poorly drained soils of variable texture

This association is made up of nearly level, freshwater hardwood and cypress swamps. It occupies broad areas or narrow, poorly defined drainageways. Jane Green Swamp, west of the St. Johns River and south of U.S. Highway 192, is the largest single area. All other areas are in the northern part of the county. Vegetation in the hardwood swamps consists of bay, gum, maple, and other wetland species. Some areas have pure stands of cypress.

This association makes up about 10,000 acres, or slightly less than 2 percent of the land area in the county.

The soils are poorly drained and very poorly drained and are flooded for long periods. Organic and mineral soils are in these swamps, but all are too wet and inaccessible to map separately.

This association is unimproved and is still in natural vegetation. It provides food and cover for wildlife.

Limitations are very severe for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, all-weather surfaced local roads and streets, and recreational developments, because the soils are very wet and are flooded for long periods.

12. Tidal marsh-Tidal swamp association

Nearly level, very poorly drained, saline to brackish soils of variable texture

This association is made up of salt or brackish marshes and mangrove swamps. It is on Merritt Island, mostly within the John F. Kennedy Space Center; on the south beach area north of Sebastian Inlet; and west of Cocoa Beach along the Banana River. The natural vegetation in the swamps is mangrove trees, and in the marshes it is salt-tolerant grasses and shrubs. A large part of the association has been diked so that constant water levels can be maintained with artesian wells or pumps for mosquito control and wildlife habitat. These dikes overflow only occasionally during storms. Undiked areas are flooded daily by tides.

This association makes up about 34,200 acres, or slightly more than 5 percent of the land area in the county.

Constant flooding and tangled mangrove growth make examination of the soils very difficult. Most areas are mineral soils and scattered spots of organic soils. The mineral soils are mixed sand and shell fragments and have lenses or balls of clayey material in places. They are saline to brackish.

Most of this association is still in natural vegetation. Some areas near urban centers have been filled with material dredged from the Banana River or Sykes Creek. The Long Point Recreational Area was developed from Tidal swamp. This association has no value for farming, but it provides roosting and nesting places for many birds and spawning places for marine life.

Limitations are very severe for residential and light industrial developments, septic tank absorption fields, unpaved streets and roads, all-weather surfaced local

roads and streets, and recreational developments. The association is below sea level. Unsuitable material must be removed and then backfilled with stable material that generally is dredged from nearby water areas.

Descriptions of the Soils

This section describes the soil series and mapping units in Brevard County. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series hold true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a moist soil, and the percentage of coarse fragments is a volume measurement.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Tidal marsh, for example, does not belong to a soil series, but nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, range site, and woodland group in which the mapping unit has been placed. The page for the description of each capability unit and range site can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 3. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*11*).

A given soil series in this county may be identified by a different name in a recently published soil survey of an

TABLE 3.—*Approximate acreage and proportionate extent of soils*

Soil name	Area	Extent
	Acres	*Percent*
Anclote sand	21, 075	3. 2
Astatula fine sand, dark surface	3, 890	. 6
Astatula-Urban land complex	1, 900	. 3
Basinger sand	9, 010	1. 4
Bradenton fine sand, shallow variant	1, 960	. 3
Canaveral complex, gently undulating	8, 760	1. 3
Canaveral-Urban land complex	9, 345	1. 4
Canova peat	4, 105	. 6
Chobee sandy loam	6, 220	. 9
Coastal beaches	1, 685	. 3
Cocoa sand	1, 960	. 3
Copeland complex	6, 505	1. 0
EauGallie sand	41, 635	6. 3
EauGallie sand, bedded	3, 215	. 5
EauGallie, Winder, and Felda soils, ponded	5, 280	. 8
Felda sand	45, 165	6. 8
Felda sand, bedded	3, 005	. 4
Felda and Winder soils	5, 025	. 8
Felda and Winder soils, ponded	3, 405	. 5
Floridana sand	22, 815	3. 4
Floridana, Chobee, and Felda soils, flooded	12, 810	1. 9
Galveston-Urban land complex	4, 275	. 7
Holopaw sand	6, 895	1. 0
Immokalee sand	34, 370	5. 2
Malabar sand	12, 330	1. 9
Malabar, Holopaw, and Pineda soils	12, 950	2. 0
Micco peat	24, 960	3. 8
Montverde peat	30, 770	4. 7
Myakka sand	62, 170	9. 4
Myakka sand, ponded	6, 775	1. 0
Myakka-Urban land complex	6, 035	. 9
Oldsmar sand	3, 955	. 6
Orsino fine sand	1, 555	. 2
Palm Beach sand	5, 565	. 8
Paola fine sand, 0 to 5 percent slopes	6, 605	1. 0
Paola fine sand, 5 to 12 percent slopes	1, 230	. 2
Paola-Urban land complex	3, 205	. 5
Parkwood fine sand, moderately fine subsoil variant	1, 535	0. 2
Pineda sand	20, 935	3. 2
Pineda sand, bedded	2, 390	. 4
Pineda sand, dark surface variant	1, 865	. 3
Pomello sand	16, 440	2. 5
Pomello-Urban land complex	3, 790	. 6
Pompano sand	10, 785	1. 6
Quartzipsamments, smoothed	6, 090	. 9
Satellite sand	2, 795	. 4
St. Johns sand	6, 510	1. 0
St. Johns soils, ponded	4, 380	. 7
St. Lucie fine sand, 0 to 5 percent slopes	2, 545	. 4
St. Lucie fine sand, 5 to 12 percent slopes	515	. 1
Spoil banks	2, 430	. 4
Swamp	19, 560	3. 0
Tavares fine sand	1, 625	. 3
Terra Ceia muck	6, 355	1. 0
Tidal marsh	2, 890	. 4
Tidal swamp	5, 435	. 8
Tomoka muck	30, 650	4. 6
Urban land	5, 850	. 9
Valkaria sand	2, 945	. 4
Wabasso sand	19, 315	2. 9
Welaka sand	2, 945	. 4
Winder loamy sand	9, 055	1. 4
Borrow pits	620	. 1
Made land, sanitary land fill	175	(1)
Submerged marsh	20, 525	3. 1
Inland water less than 40 acres	7, 115	1. 1
Total land area	660, 480	100. 0
Inland water more than 40 acres	12, 550	--------
Salt water	159, 245	--------
Total area in county	832, 275	--------

[1] Less than 0.05 percent.

adjacent county. Such differences in name result from changes in the concept of soil classification that have occurred since publication. The characteristics of the soil series described in this county are considered to be within the range defined for that series. In those instances where a soil series has one or more features outside the defined range, the differences are explained.

Anclote Series

The Anclote series consists of nearly level, very poorly drained sandy soils that have a thick, dark-colored surface layer. These soils are in broad areas on flood plains, in marshy depressions in the flatwoods, and in poorly defined drainageways. They formed in sandy marine sediments.

In a representative profile the surface layer is black sand about 19 inches thick. Below this is 43 inches of gray sand and 10 inches of light-gray sand.

Permeability is rapid in all layers. The available water capacity is moderate in the surface layer and low below this layer. Organic-matter content is high in the surface layer, and natural fertility is low.

Representative profile of Anclote sand, about 150 feet southwest of the crossroads of two poor motor roads, SW¼NE¼ sec. 5, T. 24 S., R. 35 E.:

A11—0 to 10 inches, black (10YR 2/1, rubbed) sand; weak, medium, granular structure; very friable; many fine roots; high organic-matter content; slightly acid; clear, smooth boundary.

A12—10 to 19 inches, black (10YR 2/1) sand; few, medium, faint, very dark gray, vertical mottles along old root channels; weak, fine, granular structure; friable; common fine and few medium roots; slightly acid; clear, wavy boundary.

C1—19 to 62 inches, gray (5Y 5/1) sand; single grain; loose; few faint mottles of very dark gray in upper few inches; uncoated sand grains; neutral; clear, wavy boundary.

C2—62 to 72 inches, light-gray (10YR 6/1) sand; single grain; loose; uncoated sand grains; neutral.

Anclote soils are strongly acid to moderately alkaline in the A horizon and slightly acid to moderately alkaline in the C horizon. Texture is sand, fine sand, loamy sand, or loamy fine sand in all horizons.

The A horizon is black or very dark gray, is 10 to 20 inches thick, and has an organic-matter content of 2 to 10 percent. In the lower part of the A horizon are few or common, fine or medium mottles in shades of gray.

The C horizon is grayish brown or gray to light gray and has few to common mottles of very dark gray. In some places the C horizon has few to common mottles in shades of yellow or brown.

Anclote soils are associated with EauGallie, Felda, Immokalee, Malabar, Pompano, Terra Ceia, and Wabasso soils. They are more poorly drained than all except the Terra Ceia soils. They have a thick, black A1 horizon and a grayish C horizon, whereas EauGallie, Immokalee, and Wabasso soils have a thin A1 horizon and a weakly cemented B2h horizon. Anclote soils are sandy to a depth of 72 inches or more, in contrast with Felda and Floridana soils, which have a loamy B2tg horizon. They lack the B2ir horizon that is typical of Malabar soils. They are mineral soils, whereas Terra Ceia soils are organic.

Anclote sand (An).—This is a nearly level, very poorly drained sandy soil in marshy depressions in the flatwoods, in broad areas on flood plains, and in poorly defined drainageways. In most years the water table is within a depth of 10 inches for more than 6 months. In dry seasons it is deeper, but is seldom below a depth of 40 inches. This soil is occasionally flooded 2 to 7 days following heavy rains.

Included with this soil in mapping are small areas of Terra Ceia muck or Tomoka muck and Felda and Floridana soils. Also included are a few areas where the texture is fine sand, loamy fine sand, or loamy sand and small areas that have a black surface layer less than 10 inches thick.

Many areas are in natural vegetation of grass, and a few are covered with thick stands of hardwoods. Some areas are used for range.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants. It is poorly suited to citrus. Capability unit IIIw-2; Slough range site; woodland group 14.

Astatula Series

The Astatula series consists of nearly level and gently sloping, excessively drained sandy soils on ridges. These soils formed in sandy marine or eolian sediments and are more than 95 percent quartz.

In a representative profile the surface layer is dark grayish-brown fine sand about 5 inches thick. Next is about 9 inches of yellowish-brown fine sand. Below this is yellow fine sand that extends to a depth of 120 inches.

Permeability is very rapid, and the available water capacity is low in all layers. Organic-matter content and natural fertility are low.

Representative profile of Astatula fine sand, dark surface, in a wooded area about 1 mile west of State Road No. 3, SW¼NE¼ sec. 22, T. 24 S., R. 36 E.:

O1—1 inch to 0, partly decomposed surface litter of pine needles, twigs, and branches.

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) fine sand; single grain; loose; many fine and medium roots and few large roots; strongly acid; clear, wavy boundary.

C1—5 to 14 inches, yellowish-brown (10YR 5/6) fine sand; common medium and coarse mottles of brown (10YR 5/3) in old root channels; few fine, medium, and large roots; many clean sand grains; strongly acid; gradual, wavy boundary.

C2—14 to 120 inches, yellow (10YR 7/8) fine sand; single grain; loose; very few fine and medium roots in upper few inches; many clean sand grains; strongly acid.

The A horizon is very strongly acid to slightly acid. It is dark brown to dark grayish brown and 2 to 18 inches thick.

The C horizon is strongly acid and very strongly acid. It is dark yellowish brown or yellow to very pale brown to a depth of 80 inches or more. It generally is darker colored in the upper part and becomes lighter colored with increasing depth. In some profiles it has mottles of gray or white, the color of the clean sand grains. These soils are less than 5 percent silt and clay between depths of 10 to 40 inches. The water table is below a depth of 10 feet.

Astatula soils are associated with Paola, Pomello, and St. Lucie soils. They lack the A2 and the B horizons, both of which are typical of Paola soils. Their C horizon is yellowish or very pale brown, whereas that of St. Lucie soils is white. They are better drained than Pomello soils and lack the B2h horizon that is typical of those soils.

Astatula fine sand, dark surface (As).—This is a nearly level to gently sloping, excessively drained, sandy soil on high undulating ridges. This soil has the profile described as representative of the series. The water table is below 10 feet all the time.

Included with this soil in mapping are areas of sloping and strongly sloping soils and a few areas of modal Astatula fine sand and Paola soils.

The natural vegetation is open forest of longleaf pine and scattered scrub oak and hickory in places. The understory is mainly native grasses.

This soil is poorly suited to most vegetables, but it is moderately well suited to watermelons. It is well suited to citrus, to which many areas have been planted. It is moderately well suited to deep-rooted improved pasture grasses, lawn grasses, and most kinds of ornamental plants. Capability unit IVs–1; Sandhill range site; woodland group 2.

Astatula-Urban land complex (At).—This is a nearly level to gently sloping soil that was formerly Astatula fine sand, dark surface, but now much of it has been altered for use as building sites or covered with pavement or buildings. About 45 to 65 percent of the land area is Astatula fine sand, dark surface. The rest is mostly Astatula fine sand, dark surface, but it has been reworked and reshaped. About 20 to 45 percent of the land area is covered with houses, streets, driveways, buildings, parking lots, and other related structures. Most areas that are not covered with pavement and buildings are in lawns, vacant lots, or playgrounds and generally are so small and intermixed with Urban land that it is impractical to map them separately.

This complex has been reworked less in the older communities than in the newer, more densely populated ones. Excavating streets below the original soil surface and spreading this material on adjacent areas has been a common practice in the newer developments. This excavated material is used to fill low places.

Included in the areas mapped are small areas of Paola, Pomella, St. Lucie, and Tavares soils and Made land. Also included are a few small areas that are sloping or strongly sloping, and a few that are either more than 45 percent or less than 20 percent Urban land.

This complex is moderately well suited to lawn grasses and most kinds of ornamental plants. Not assigned to a capability unit, range site, or woodland group.

Basinger Series

The Basinger series consists of nearly level, poorly drained sandy soils in sloughs and depressions in the flatwoods. These soils formed in sandy marine sediments.

In a representative profile the surface layer is sand about 8 inches thick. The upper 2 inches is very dark gray and the lower 6 inches is grayish brown. Below this is about 12 inches of gray sand. The next layer is 7 inches of dark-brown sand that has brownish-yellow and light brownish-gray mottles. Below this, to a depth of 80 inches, is brown sand.

Permeability is very rapid and the available water capacity is very low to low in all layers. Natural fertility and organic-matter content are low.

Representative profile of Basinger sand in a grassy slough about 1.75 miles west of U.S. Highway No. 1 on the road leading to Canaveral Grove Estates and about 100 yards south of a poor motor road, NE¼NE¼ sec. 2, T. 24 5., R. 35 E.:

A11—0 to 2 inches, very dark gray (N 3/0, rubbed) sand; single grain; loose; nonsticky; common fine roots; slightly acid; gradual, smooth boundary.

A12—2 to 8 inches, grayish-brown (10YR 5/2) sand; many, medium and coarse, dominantly vertical-oriented streaks of very dark gray (10YR 3/1); single grain; loose; common fine roots; slightly acid; gradual, wavy boundary.

A2—8 to 20 inches, gray (10YR 5/1) sand; few, medium and coarse, very dark gray (10YR 3/1) vertical streaks in upper 6 inches; single grain; loose; few fine roots; slightly acid; clear, wavy boundary.

C&Bh—20 to 27 inches, dark-brown (10YR 3/3) sand; few, coarse, distinct, brownish-yellow (10YR 6/8) mottles and common, medium, distinct, light brownish-gray (10YR 6/2) mottles; single grain; loose; many uncoated sand grains; medium acid; gradual, wavy boundary.

C1—27 to 40 inches, brown (10YR 4/) sand; few, medium, faint, dark-brown (10YR 3/3) mottles; single grain; loose; many uncoated sand grains; slightly acid; clear, wavy boundary.

C2—40 to 80 inches, brown (10YR 5/3) sand; common very dark brown decaying roots in upper 10 inches; single grain; loose; uncoated sand grains; slightly acid.

Basinger soils range from very strongly acid to mildly alkaline in all horizons. Texture is sand or fine sand in all horizons.

The A1 horizon is black or very dark gray to grayish brown and is 2 to 8 inches thick. The A2 horizon is brown, grayish brown, gray, or light gray and ranges from 6 to 31 inches in thickness. Streaks of the A1 horizon extend into the A2 horizon. The C&Bh horizon is very dark grayish brown, brown, dark brown, or dark yellowish brown, has few to common mottles of lighter color, and ranges from 6 to 24 inches in thickness. The C horizon is brown to light gray and extends to a depth of 80 inches or more.

Basinger soils are associated with Anclote, Immokalee, Myakka, Pompano, St. Johns, Valkaria, and Wabasso soils. They are better drained than Anclote soils and lack the thick black A1 horizon that is typical of those soils. They have a stained C&Bh horizon, whereas Immokalee, Myakka, St. Johns, and Wabasso soils have a weakly cemented B2h horizon. They differ from Pompano soils in having a stained C&Bh horizon. They differ from Valkaria soils in not having a B2ir horizon.

Basinger sand (Ba).—This is a nearly level, poorly drained, sandy soil in sloughs of poorly defined drainageways and depressions in the flatwoods. It is occasionally flooded for 2 to 7 days following heavy rains. In most years the water table is within a depth of 10 inches for 2 to 6 months of the year, and between 10 and 40 inches for 6 months or more. In the dry seasons it is below a depth of 40 inches for short periods.

Included with this soil in mapping are small areas of St. Johns sand and some small areas of fine sands.. Also included are small areas where this Basinger sand lacks brownish-stained layers below the surface layers.

Most of the acreage is in natural vegetation of pineland three-awn and thinly scattered pine. The lowest areas are covered with maidencane and St.-Johnswort. Some areas are used for range.

If drainage and water control are adequate, this soil is moderately well suited to vegetables and well suited to improved pasture grasses and clover. It is poorly suited to citrus, lawn grasses, and most kinds of ornamental plants Capability unit IVw–1; Slough range site; woodland group 6.

Bradenton Series, Shallow Variant

The Bradenton series, shallow variant, consists of nearly level, poorly drained, sandy soils on low marine terraces. These soils formed in sandy and loamy marine sediments over limestone.

In a representative profile the surface layer is dark-gray fine sand about 3 inches thick. Below this is 9 inches of light brownish-gray to grayish-brown fine sand. The subsoil is sandy clay loam about 6 inches thick. The upper half is dark gray and has dark yellowish-brown mottles, and the lower half is gray and has yellowish-brown and gray mottles and light-gray calcareous nodules. The next 16 inches is white sandy clay loam. At a depth of about 34 inches is hard limestone.

Permeability is rapid in the sandy layers and moderate to moderately rapid in the loamy layers. The underlying limestone layer is porous, and water moves through it freely. The available water capacity is low in the surface and subsurface layers and high in the loamy layers. Natural fertility is medium, and organic-matter content is low.

Representative profile of Bradenton fine sand, shallow variant, in a citrus grove about 1.5 miles southeast of Mims and about 150 feet east of a poor motor road, NE¼NW¼ sec. 21, T. 21 S., R. 35 E.:

Ap—0 to 3 inches, dark-gray (10YR 4/1) fine sand; weak, fine, granular structure; very friable; common fine, medium and large roots; few, common, distinct, light brownish-gray (10YR 6/2) mottles; slightly acid; clear, smooth boundary.

A21—3 to 7 inches, light brownish-gray (10YR 6/2) fine sand; common, very fine, faint, gray streaks and mottles; single grain; loose; common fine roots; few medium and large roots; slightly acid; gradual, wavy boundary.

A22–7 to 12 inches, grayish-brown (10YR 5/2) fine sand; single grain; loose; common fine and few medium roots; slightly acid; abrupt, smooth boundary.

B21tg—12 to 15 inches, dark-gray (10YR 4/1) sandy clay loam; few, fine and medium, faint, dark yellowish-brown (10YR 4/4) mottles in lower 1 inch; weak, medium, granular structure; friable, slightly sticky; many fine and few medium roots; many fine pores; sand grains coated and bridged with clay; neutral; clear, wavy boundary.

B22tg—15 to 18 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; common, medium, faint, gray mottles; few, medium, distinct, yellowish-brown (10YR 5/8) mottles and few, fine, distinct, light-gray (10YR 7/2), soft calcium carbonate nodules; weak, medium, subangular blocky structure; friable, slightly sticky; common fine roots and pores; sand grains coated and bridged with silicate clay; mildly alkaline; clear, wavy boundary.

Cca—18 to 34 inches, white (N 8/0) sandy clay loam; few, medium, faint, very pale brown mottles in upper 4 to 5 inches; massive in place, parts to weak, medium, subangular blocky structure; friable; many fine, medium, and coarse calcium carbonate nodules; sand grains coated and bridged with carbonates; moderately alkaline; calcareous; abrupt, wavy boundary.

R—34 inches, hard limestone.

Bradenton soils, shallow variant, are slightly acid or neutral in the A horizon, slightly acid to moderately alkaline in the B horizon, and moderately alkaline in the Cca horizon.

The Ap horizon is black to dark grayish brown and is 3 to 6 inches thick. The A2 horizon is grayish brown to light gray and is 5 to 14 inches thick. Few to common streaks of the Ap horizon are in the A2 horizon in most places.

The B2tg horizon is dark grayish brown to grayish brown or dark gray to gray and is 5 to 19 inches thick. It has few to common, yellowish and brownish mottles and in some places a few lighter colored sandy streaks. It is sandy loam or sandy clay loam.

The Cca horizon is pale-brown to white loamy sand to sandy clay loam and is 0 to 16 inches thick. It is absent in some profiles, and the B2tg horizon rests directly on hard limestone. The Cca horizon begins between depths of 15 and 35 inches. It ranges from loamy sand to sandy clay loam. Hard limestone begins between depths of 20 and 40 inches.

Bradenton soils, shallow variant, are associated with Copeland, Felda, Myakka, Parkwood moderately fine subsoil variant, Wabasso, and Winder soils. They are better drained than Copeland soils and lack the thick, black A1 horizon that is typical of those soils. They have a loamy B2tg horizon that is closer to the surface than that in Felda soils and a limestone substratum, in contrast with the sandy and loamy C horizon in those soils. They have a loamy B2tg horizon, whereas Myakka and Wabasso soils have a weakly cemented B2h horizon. They differ from the Parkwood moderately fine subsoil variant and Winder soils in having a limestone substratum.

Bradenton fine sand, shallow variant (Br).—This is a nearly level, poorly drained soil that has limestone within a depth of 40 inches. In most years the water table is within a depth of 10 inches for 2 to 6 months and between depths of 10 and 30 inches for 6 months or more each year. In dry seasons it is below a depth of 30 inches for short periods. This soil is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of similar soils that have limestone within a depth of 20 inches and small areas of soils that have fine sand instead of sandy clay loam and rock beneath the subsoil. Also included are a few areas where the upper part of the subsoil is somewhat darker colored than that described as representative of the series.

Most areas are drained through ditches and are planted to citrus. The undeveloped areas have a natural vegetation of mixed pine, palm, and live oak and an understory of grasses, bushes, and vines. If drainage and water control are adequate, this soil is well suited to vegetables, citrus, improved pasture grasses and clover, lawn grasses, and most kind of ornamental plants. Capability unit IIIw-3; Hammock range site; woodland group 13.

Canaveral Series

The Canaveral series consists of nearly level and gently undulating, moderately well drained sandy soils mixed with shell fragments. These soils are on low dunelike ridges bordering depressions and sloughs along the Atlantic Coast. They formed in marine sands and shell fragments.

In a representative profile the surface layer is sand about 12 inches thick. The upper half is very dark grayish brown and contains a very few shell fragments, and the lower half is dark grayish brown and contains a few shell fragments. Between depths of 12 and 38 inches is pale-brown sand that contains many shell fragments. Below this, to a depth of 80 inches, is gray coarse sand and many shell fragments.

Permeability is very rapid and the available water capacity is very low in all layers. Organic-matter content and natural fertility are low.

Representative profile of Canaveral sand in a semi-wooded area in Floridana Beach, about 1/4 mile west of State Route No. A1A and about 50 feet south of Carman Street:

A11—0 to 6 inches, very dark grayish-brown (10YR 3/2) sand; single grain; loose; many fine roots and common medium and large roots; about 5 percent pale-brown, fine shell fragments; moderately alkaline; gradual, wavy boundary.

A12—6 to 12 inches, dark grayish-brown (10YR 4/2) sand; few, medium, faint, very dark grayish-brown (10YR 3/2) streaks along root channels; single grain; loose; common fine roots and few medium and large roots; about 10 percent sand-size shell fragments and few, pale-brown shell fragments up to one-fourth inch in diameter; moderately alkaline; calcareous; clear, smooth boundary.

C1—12 to 32 inches, pale-brown (10YR 6/3) sand; few, medium, faint, dark grayish-brown (10YR 4/2) streaks; about 30 percent multicolored shell fragments the size of sand grains or larger; single grain; loose; moderately alkaline; calcareous; clear, wavy boundary.

C2—32 to 38 inches, pale-brown (10YR 6/3) coarse sand and multicolored shell fragments; few, medium, distinct, very dark grayish-brown (10YR 3/2) streaks and yellowish-brown (10YR 5/6) mottles; single grain; loose; about 55 percent shell fragments sand-size to one-fourth inch in diameter; yellowish-brown color is mostly shell fragments; moderately alkaline; calcareous; clear, wavy boundary.

C3—38 to 80 inches, gray (10YR 6/1) coarse sand and multicolored shell fragments; single grain; loose; few, fine and medium, decaying roots; few, coarse, distinct, light olive-brown (2.5Y 5/4) mottles in upper 3 inches and a few, medium, distinct, dark-gray (10YR 4/1) streaks along old root channels; about 35 to 45 percent shell fragments sand-size to one-fourth inch in diameter; moderately alkaline; calcareous.

Canaveral soils are neutral to moderately alkaline in all layers. They are moderately well drained to somewhat poorly drained.

The A horizon is dark grayish brown to very dark grayish brown or black and is 6 to 12 inches thick. The part of the A horizon that is darker than dark grayish brown is less than 10 inches thick. This horizon contains very few to many fine shell fragments.

The upper part of the C horizon, to a depth of about 38 inches, is pale brown, brown, or light gray to gray and contains few to common streaks of darker color along many root channels. The lower part of the C horizon is stratified or a mixture of sand and shell fragments and extends to a depth of 80 inches or more. The C horizon is 15 to 90 percent shell fragments as much as a half inch in diameter.

Canaveral soils are associated with Anclote, Palm Beach, Pompano, and Welaka soils and Coastal beaches. They are better drained than Anclote soils. They lack the thick, black A1 horizon that is typical of Anclote soils, and they contain shell fragments. In contrast with Coastal beaches, they are not flooded by tides. They are more poorly drained than Palm Beach sand. In contrast with Pompano soils, they contain shell fragments and are not so poorly drained. They lack the B2ir horizon that is typical of Welaka soils.

Canaveral complex, gently undulating (Ca).—This complex consists of nearly level and gently sloping soils that are mixtures of sand and shell fragments. It is along the Atlantic Coast on narrow ridges interspersed with parallel narrow sloughs. The water table is between depths of 10 and 40 inches for 2 to 4 months a year. In dry seasons it is below a depth of 60 inches.

The individual soils of this complex are so intermixed that it was impractical to map them separately. About 60 percent of this complex is a Canaveral sand on long, narrow, 50- to 500-feet wide ridges that roughly parallel the Atlantic Coast. About 30 percent is a poorly drained Canaveral soil in sloughs that are 25 to 350 feet wide between ridges. This soil has a profile similar to the one described as representative of the Canaveral series, but its surface layer generally is darker and thicker, and the water table is nearer the surface for longer periods.

Included with this complex in mapping in a few places on ridges are small areas of Pomello, Palm Beach, and Welaka soils. Also included in a few narrow sloughs are areas of an Anclote soil and the Parkwood moderately fine subsoil variant.

The natural vegetation is saw-palmetto and scrub live oak on ridges and sand cordgrass in sloughs.

These soils are not suited to vegetables and citrus. They are poorly suited to improved pasture grasses, lawn grasses, and most kinds of ornamental plants. Capability unit VIs-4; Sand Scrub range site; woodland group 4.

Canaveral-Urban land complex (Cc).—This complex consists of Canaveral sand and Urban land. About 20 to 40 percent of the acreage is covered with houses, streets, driveways, buildings, parking lots, and other construction related to urban use. About 70 percent of the area not covered by buildings and pavement is a mixture of sand and shells that have been dredged from the Indian and Banana Rivers, deposited on tidal marshes and swamps, and then leveled and smoothed. Soils in these areas have properties similar enough to Canaveral soils to be called Canaveral sand. Shells make up 10 to 80 percent of the fill material. The percentage of sand and shells varies from place to place. The sand is fine to coarse. In some places there are balls of clayey or loamy material. About 15 percent of the openland is former low wetland that has been filled with sand from higher areas. Undisturbed areas of Anclote, Canaveral, Myakka, and Pompano soils make up about 10 to 20 percent of some areas.

Most areas of this complex are artificially drained. In wet seasons the water table is between depths of 40 to 60 inches, and the rest of the year it is below a depth of 60 inches. The fill material ranges from about 12 to 72 inches or more in thickness but averages about 45 inches.

In most places this Canaveral-Urban land complex is poorly suited to lawn grasses and most kinds of ornamental plants. Not assigned to a capability unit, range site, or woodland group.

Canova Series

The Canova series consists of nearly level, very poorly drained soils that have an organic surface layer and a loamy subsoil. These soils are in broad areas on flood plains. They formed in thin deposits of herbaceous organic materials and underlying loamy marine sediment.

In a representative profile a layer of dark reddish-brown peat about 9 inches thick is at the surface. The mineral surface layer is grayish-brown sand about 7 inches thick. It is underlain by 6 inches of light-gray sand. Below this is 21 inches of gray sandy clay loam that has yellowish-brown and dark yellowish-brown mottles; 18 inches of gray, mottled sandy clay loam that has

lenses and pockets of sandy loam and loamy sand; and 5 inches of light-gray sandy clay loam that has a few yellowish-brown mottles.

Permeability is rapid in the organic and sandy layers and moderate in the loamy layers. The available water capacity is high in the surface layer, very low in the sandy layers, and moderate in the loamy layers. Organic-matter content is very high in the surface layer, and natural fertility is moderate.

Representative profile of Canova peat in a field about 5 miles south of State Route No. 514 and 325 feet southwest of ditch, NE1/4NE1/4 sec. 32, T. 29 S., R. 36 E.:

Oi—9 inches to 0, dark reddish-brown (5YR 2/2, unrubbed and rubbed) peat; about 80 percent fiber, 65 percent fiber, rubbed; massive; sodium pyrophosphate extract color is light gray (10YR 7/1); many fine roots; slightly acid; abrupt, smooth boundary.

A1—0 to 7 inches, grayish-brown (10YR 5/2) sand; single grain; loose; few fine roots; few, medium, distinct, very dark grayish-brown (10YR 3/2) streaks; slightly acid; gradual, wavy boundary.

A2—7 to 13 inches, light-gray (10YR 7/2) sand; few, medium, distinct, grayish-brown (10YR 5/2) mottles; single grain; loose; few fine roots; slightly acid; abrupt, irregular boundary.

B21tg—13 to 23 inches, gray (10YR 5/1) sandy clay loam; few, medium, distinct, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; few, coarse, distinct tongues of dark-gray (10YR 4/1) sand; sand grains coated and bridged with clay; slightly acid; gradual, wavy boundary.

B22tg—23 to 34 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/8) and dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; gradual, wavy boundary.

B31g—34 to 52 inches, gray (10YR 5/1) sandy clay loam; common, fine, faint, light-gray carbonatic mottles and few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; lenses and pockets of sandy loam and loamy sand; moderately alkaline; calcareous; clear, wavy boundary.

B32g—52 to 57 inches, light-gray (10YR 6/1) sandy clay loam; massive; friable; many, fine, medium and coarse, distinct, light-gray (10YR 7/2) carbonatic mottles and few, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; moderately alkaline; calcareous.

Canova soils are slightly acid to moderately alkaline in the Oi, A, and B2tg horizons and mildly alkaline or moderately alkaline in the B3g horizon.

The Oi horizon is 5 to 16 inches thick. The A1 horizon is gray to very dark gray or grayish brown and is 3 to 11 inches thick. The A2 horizon, 4 to 9 inches thick, is grayish brown to white, and is mottled with lighter or darker colors in most places. The A horizon ranges from 7 to 16 inches in thickness.

The B2tg horizon is dark gray to gray and has few to common yellowish mottles. It is 6 to 24 inches thick, is sandy loam or sandy clay loam, and contains few to common vertical sandy streaks or tongues. The B3g horizon is dark gray to light gray and is mottled. It contains common, fine to medium, soft to hard, light-gray to white fragments of carbonatic material. It is sandy loam or sandy clay loam and contains common lenses and pockets of sandy loam, loamy sand, or sand. It is calcareous and in some places contains shell fragments.

Canova soils are associated with Felda, Micco, Montverde, Terra Ceia, Tomoka, and Winder soils. In contrast with Felda and Winder soils, they are more poorly drained and have an organic surface layer. They have much thinner organic layers than Micco, Montverde, Terra Ceia, and Tomoka soils.

Canova peat (Cd).—This is a nearly level, very poorly drained soil that has a peat surface layer and a loamy subsoil. It is on broad flood plains. In most years the water table is within a depth of 10 inches for 9 to 12 months and many areas are continuously flooded for 3 to 6 months. In dry seasons the water table is below a depth of 10 inches for short periods.

Included with this soil in mapping in some areas are spots of Micco and Tomoka soils, a few areas of soils that have a thin, dark-colored, organic-stained layer above the subsoil, and small areas of Canova muck.

A large part of the acreage is in natural vegetation of maidencane, flags, and other herbaceous plants and scattered woody button bush. Some areas are used for range. Because this soil is naturally subject to frequent flooding, most areas are now protected by dikes.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants. It is not suited to citrus. Capability unit IIIw-4; Fresh Marsh (organic) range site; not assigned to a woodland group.

Chobee Series

The Chobee series consists of nearly level, very poorly drained soils in marshy depressions and low areas of the flood plains. These soils formed in loamy marine sediments.

In a representative profile the surface layer is sandy loam about 14 inches thick. It is black in the upper 4 inches and very dark gray in the lower 10 inches. The upper 11 inches of the next layer is dark-gray sandy clay loam that has olive-brown and gray mottles. The lower 13 inches is gray sandy clay loam, mottled with shades of brown, that contains some hard calcareous nodules. Below this, to a depth of 63 inches, is light-gray sandy clay loam that has brownish mottles and dark-gray sand streaks.

Permeability is moderately rapid to a depth of about 14 inches and moderate below that depth. The available water capacity is moderate, and organic-matter content is high. Natural fertility is moderate.

Representative profile of Chobee sandy loam in a native pasture about 175 feet north of U.S. Highway No. 192 and about 0.6 mile west of the junction of Interstate Highway No. 95 and U.S. Highway No. 192, SW1/4 NW1/4 sec. 3, T. 28 S., R. 36 E.:

A11—0 to 4 inches, black (5YR 2/1, rubbed) sandy loam; moderate, medium, granular structure; friable; common fine roots and few medium roots; mildly alkaline; gradual, wavy boundary.

A12—4 to 9 inches, very dark gray (10YR 3/1) sandy loam; common, medium, faint, dark-gray streaks and pockets; moderate, medium, granular structure; few fine roots; friable; mildly alkaline; gradual, wavy boundary.

A13—9 to 14 inches, very dark gray (10YR 3/1) sandy loam; moderate, medium, granular structure; friable; few fine roots; mildly alkaline; clear, irregular boundary.

B21tg—14 to 25 inches, dark-gray (10YR 4/1) sandy clay loam; common, fine, distinct, olive-brown (2.5Y 4/4) mottles and common, medium, faint, gray mottles; weak, coarse, subangular blocky structure; friable, slightly sticky; common, fine, decaying roots; sand grains coated and bridged with clay; few, medium,

distinct streaks of loamy sand; mildly alkaline; clear, wavy boundary.

B22tgca—25 to 38 inches, gray (N 5/0) sandy clay loam; many, medium and coarse, distinct, light olive-brown (2.5Y 5/4), calcareous mottles; common, medium and coarse, light olive-brown, moderately hard, calcareous nodules and few, medium, distinct, yellowish-brown (10YR 5/6), moderately hard, calcareous nodules; weak, coarse, subangular blocky structure; friable, slightly sticky; common fine decaying roots; few, coarse, distinct streaks of loamy sand and sandy loam; sand grains coated and bridged with silicate clay in gray matrix; moderately alkaline; calcareous; gradual, wavy boundary.

Cg—38 to 63 inches, light-gray (N 6/0) sandy clay loam; few, coarse, distinct, dark-gray (10YR 4/1) sand streaks and common, fine and medium, distinct, slightly calcareous, light olive-brown (2.5Y 5/4) mottles; few, fine, decaying roots; massive; friable, slightly sticky; moderately alkaline; calcareous; gradual, wavy boundary.

Chobee soils are slightly acid to mildly alkaline in the A horizon and mildly alkaline or moderately alkaline in the B and C horizons.

The A horizon is black or very dark gray, is 10 to 18 inches thick, and has an organic-matter content of about 5 to 15 percent.

The B21tg horizon begins within a depth of 20 inches and is dark-gray to black sandy loam or sandy clay 4 to 12 inches thick. It has few to common mottles of other colors and few to common streaks of loamy sand. The B22tgca horizon is dark grayish-brown to gray sandy loam or sandy clay loam that has common to many mottles in shades of brown and yellow. It is 8 to 18 inches thick and has few to common sandy streaks.

The Cg horizon is dark grayish-brown to light-gray loamy sand to sandy clay loam. It has mottles of other colors and few to common lenses of sand. Shell fragments are below a depth of 38 inches in many places.

Chobee soils are associated with Anclote, Felda, Floridana, Pineda, Pompano, Terra Ceia, and Tomoka soils. They are loamy in all layers. In contrast, Anclote soils are sandy in all layers and Floridana soils have a sandy surface layer and a loamy subsoil. Chobee soils are more poorly drained than Felda, Pineda, and Pompano soils, all of which lack the thick dark-colored A1 horizon characteristic of Chobee soils. They are mineral soils, and Terra Ceia and Tomoka soils are organic soils.

Chobee sandy loam (Ch).—This is a nearly level, very poorly drained, loamy soil that has a thick black surface layer. It is in marshy depressions and on flood plains along streams. In most years the water table is within a depth of 10 inches for 6 to 9 months and between 10 to 40 inches for 3 to 6 months. In very dry seasons the water table is below a depth of 40 inches for short periods. This soil is continuously flooded for 1 to 6 months in many places.

Included with this soil in mapping are small areas of Floridana sand. Also included are small areas of soils that have a finer textured surface layer and small areas of Terra Ceia muck.

A large part of the acreage is in natural vegetation of sand cordgrass, and some areas are covered with swamp hardwoods. Some areas are used for range, and a few are in improved pastures.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants. It is poorly suited to citrus. Capability unit IIIw-2; Fresh Marsh (mineral) range site; woodland group 14.

Coastal Beaches

Coastal beaches (Ck) consists of narrow strips of nearly level or gently sloping sand, along the Atlantic Ocean, that is covered with salt water at daily high tides and of low dunes adjacent to the tide-washed sands. This material is a mixture of quartz sand and fragments of sea shells. It is subject to movement by the wind and the tide and is bare of vegetation. In places clay balls are imbedded in the sand.

Coastal beaches is associated with Palm Beach, Canaveral, and Welaka soils. In contrast with those soils it is subject to wave action.

Coastal beaches is used intensively for recreation during the warmer months. Homes, beach cottages, motels, and apartment buildings have been built on the fringes of the beaches in many places. The only vegetation is salt-tolerant plants. Capability unit VIIIw-1; not assigned to a range site or woodland group.

Cocoa Series

The Cocoa series consists of nearly level and gently sloping, well-drained sandy soils underlain by coquina rock. These are undulating soils on low ridges. They formed in thin to moderately thick deposits of sandy marine or eolian sediments overlying coquina rock.

In a representative profile the surface layer is dark-brown sand about 6 inches thick. Below this is 14 inches of strong-brown sand. The next layer is yellowish-red to red sand about 12 inches thick. The subsoil is 6 inches of red loamy sand. Hard coquina rock is at a depth of 38 inches. Deep solution holes occur in the rock in many places.

Permeability is rapid in all layers. The coquina rock is porous and permeable. The available water capacity is very low in the sand surface layer and low in the loamy sand layer. Organic-matter content and natural fertility are low.

Representative profile of Cocoa sand in an old citrus grove about 250 feet south of a poor motor road that begins about 1¼ miles north of the intersection of U.S. Highway 1 and State Route No. 515, NW¼NE¼ sec. 26, T. 25 S., R. 36 E.:

Ap—0 to 6 inches, dark-brown (7.5YR 3/2) sand; weak, fine, granular structure; very friable; many fine and few medium roots; neutral; abrupt, smooth boundary.

A2—6 to 20 inches, strong-brown (7.5YR 5/6) sand; single grain; loose; few fine and medium roots; few, medium, distinct, dark grayish-brown (10YR 4/2) streaks along old root channels; sand grains coated with oxides; slightly acid; gradual, wavy boundary.

A31—20 to 27 inches, yellowish-red (5YR 5/8) sand; single grain; loose; few fine and medium roots; common coated sand grains; medium acid; gradual, wavy boundary.

A32—27 to 32 inches, red (2.5YR 4/6) sand; weak, fine, granular structure; very friable; many coated sand grains; medium acid; gradual, wavy boundary.

B2t—32 to 38 inches, red (2.5YR 4/6) loamy sand; weak, medium, granular structure; friable; sand grains coated and bridged with clay; slightly acid; abrupt, wavy boundary.

IIR—38 inches, pale-brown hard coquina rock.

Cocoa soils are medium acid to mildly alkaline in all layers.

The Ap horizon is mainly dark brown to very dark gray, but in a few places ranges to gray or brown. It is 3 to 8 inches thick. The A2 horizon ranges from brown through

yellowish brown to reddish yellow, is 8 to 16 inches thick, and contains fragments of coquina rock in places. The A3 horizon is yellowish red to red and is 4 to 20 inches thick.

The B2t horizon is dark brown to red loamy sand, loamy fine sand, or sand that is at least 3 percent more clay than the layer above it. It is 5 to 16 inches thick.

The depth to multicolored coquina rock ranges from 20 to 54 inches, but averages about 38 inches.

Cocoa soils are associated with Anclote, Astatula, Paola, Pomello, and St. Lucie soils. They are underlain by coquina rock and the others are not. They are better drained than Anclote soils and do not have the thick black A1 horizon characteristic of those soils. They are redder in all layers than the associated soils. They do not have the white A2 horizon that is typical of Paola soils nor the thick white C horizon typical of St. Lucie soils. Cocoa soils are better drained than Pomello soils and do not have the weakly cemented B2h horizon that is typical of those soils.

Cocoa sand (Co).—This is a nearly level and gently sloping, well-drained, sandy soil over coquina rock. It is on low undulating ridges. The water table is below a depth of 6 feet all the time.

Included with this soil in mapping are several areas of soils that are fine sand in texture, areas where the coquina rock is at a depth of less than 20 inches or more than 54 inches, and a few areas where the subsoil is sandy clay loam.

Most areas are in citrus groves or abandoned citrus groves, but a few are in natural vegetation of mixed oak, pine, and a few hickory.

This soil is well suited to citrus. It is poorly suited to vegetables, but is moderately well suited to watermelons. It is moderately well suited to improved pasture grasses, lawn grasses, and many kinds of ornamental plants. In a few places the coquina rock is mined and used in bituminous mixtures for road surfaces. Capability unit IVs-3; Sandhill range site; woodland group 9.

Copeland Series

The Copeland series consists of nearly level, very poorly drained soils on low flats. These soils formed in moderately thick beds of sandy and loamy marine sediments over limestone.

In a representative profile the surface layer is black loamy fine sand about 12 inches thick. Below this is 3 inches of dark-gray loamy fine sand. The subsoil is about 7 inches of gray sandy clay loam. Below this is about 8 inches of light-gray marl. Hard limestone is at a depth of about 30 inches.

Permeability is rapid in the sandy layers and moderate in the loamy layer. The available water capacity is moderate in all layers. Organic-matter content is high, and natural fertility is moderate.

Representative profile of Copeland loamy fine sand in a wooded area about 100 feet south of a good motor road, SE¼SE¼ sec. 23, T. 23 S., R. 36 E.

A11—0 to 6 inches, black (10YR 2/1) loamy fine sand; moderate, medium, granular structure; friable; many fine, medium, and large roots; high organic-matter content; mildly alkaline; gradual, smooth boundary.

A12—6 to 12 inches, black (10YR 2/1) loamy fine sand; common, fine, distinct, dark-gray (10YR 4/1) streaks; moderate, medium, granular structure; friable; common fine, medium, and large roots; mildly alkaline; clear, wavy boundary.

A2—12 to 15 inches, dark-gray (10YR 4/1) loamy fine sand; moderate, medium, granular structure; friable; common fine, medium, and large roots; mildly alkaline; abrupt, wavy boundary.

B2tg—15 to 22 inches, gray (10YR 5/1) sandy clay loam; moderate, medium, subangular blocky structure; friable; common fine, medium, and large roots; few fine pores; sand grains coated and bridged with clay and clay-size carbonates; moderately alkaline; gradual, wavy boundary.

IIC—22 to 30 inches, light-gray (10YR 6/1) marl; weak, coarse, subangular blocky structure; friable; sand grains coated with clay and silt-size carbonates; about 20 percent hard limestone fragments ⅛ to 1 inch in diameter; moderately alkaline; calcareous; abrupt, wavy boundary.

IIR—30 inches, limestone.

Copeland soils are slightly acid to mildly alkaline in the A horizon and mildly alkaline or moderately alkaline in the B2tg horizon.

The A1 horizon is black to very dark gray and is 10 to 17 inches thick. The A2 horizon is dark gray to grayish brown and is 2 to 5 inches thick.

The B2tg horizon is light-gray to grayish-brown sandy clay loam or sandy loam 4 to 10 inches thick.

The IIC horizon is white or light gray, is 4 to 8 inches thick, and has few to many fragments of limestone.

Depth to limestone is 20 to 40 inches.

Copeland soils are associated with Bradenton shallow variant, Felda, Myakka, and Wabasso soils. They are more poorly drained than any of those soils, and they have a thick black surface layer that the other soils lack. Copeland soils are shallower than Felda, Myakka, and Wabasso soils. They have a thicker darker colored surface layer than the Bradenton soils, shallow variant. Copeland soils do not have a weakly cemented Bh horizon that is typical of Myakka and Wabasso soils.

Copeland complex (Cp).—This complex consists of several nearly level, very poorly drained soils on low flats. In most years the water table is within a depth of 10 inches for more than 6 months. In dry seasons it is between 10 and 30 inches. This soil is flooded for 7 days to a month once in 5 to 20 years. Some areas are underlain by coquina rock instead of limestone.

The soils in this complex are so intermixed that it was impractical to map them separately. About 6 percent is Copeland loamy fine sand; 55 percent is a soil that is similar to Copeland loamy fine sand, but has limestone at a depth of about 20 inches and a subsoil of sandy loam; about 8 percent is an area where the black surface layer is underlain by hard limestone, generally within a depth of 10 inches; about 5 percent is a Wabasso soil; 10 percent is a soil similar to the Wabasso soil, but has limestone beneath the loamy layers; and 16 percent is scattered spots of Bradenton shallow variant, Chobee, Felda, Myakka, and St. Johns soils.

The natural vegetation is typically a few pines and a thick growth of cabbage palm and hardwoods, such as live oaks, magnolia, bay, and sweetgum. These soils are poorly suited to vegetables and other cultivated crops. They are also poorly suited to citrus, but some areas have been cleared of the thick growth and citrus trees have been planted. Bedding and water control have altered the soils enough in these places to make them moderately well suited to citrus.

If drainage and water control are adequate, these soils are well suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental shrubs. Capability unit IVw-3; Hammock range site; woodland group 12.

EauGallie Series

The EauGallie series consists of nearly level, poorly drained sandy soils in the flatwoods. These soils are mainly on broad, low ridges. Some are in sloughs and shallow ponds. All formed in beds of sandy and loamy marine sediments.

In a representative profile the surface layer, about 5 inches thick, is black sand that is underlain by 17 inches of gray to light-gray sand. The subsoil extends to a depth of 50 inches. The upper 10 inches is black sand. The next 3 inches is dark reddish-brown sand. These layers are weakly cemented, and the sand grains are coated with organic matter. The lower 15 inches is dark-brown sand that contains common, dark reddish-brown, weakly cemented fragments. Below this is 5 inches of dark-gray sand and 6 inches of light brownish-gray sandy clay loam. Between depths of 61 and 84 inches are lenses and pockets of light brownish-gray sand, loamy sand, and sandy loam. A few yellowish-brown mottles are in this layer.

Permeability is rapid to a depth of about 22 inches, moderate to moderately rapid from 22 to 35 inches, rapid from 35 to 55 inches, moderate to moderately rapid from 55 to 61 inches, and rapid below 61 inches. The available water capacity is very low in the upper sandy layers, low in the layers from a depth of 22 to 55 inches, and medium in the layers below 55 inches. Organic-matter content and natural fertility are low.

Representative profile of EauGallie sand in a wooded area about 75 feet west of Wickham Road and about 0.3 mile south of junction of Wickham Road and Kennedy Airport Road, SE¼NE¼ sec. 36, T. 27 S., R. 36 E.:

A1—0 to 5 inches, black (N 2/0, rubbed) sand; weak, fine, granular structure; very friable; many fine and few medium roots; very strongly acid; smooth boundary.

A21—5 to 14 inches, gray (10YR 5/1) sand; single grain; loose; few fine and medium roots; very strongly acid; gradual, wavy boundary.

A22—14 to 22 inches, light-gray (10YR 6/1) sand; single grain; loose; few fine and medium roots; very strongly acid; abrupt, wavy boundary.

B21h—22 to 26 inches, black (N 2/0) sand; moderate, medium, granular structure; weakly cemented; common fine roots; coatings of organic matter on sand grains; medium acid; clear, wavy boundary.

B22h—26 to 32 inches, black (5YR 2/1) sand; moderate, medium, granular structure; firm, weakly cemented; few fine and medium roots; coatings of organic matter on sand grains; medium acid; clear, wavy boundary.

B23h—32 to 35 inches, dark reddish-brown (5YR 3/3) sand; moderate, medium, granular structure; friable; common, fine and medium, distinct, weakly cemented, black (5YR 2/1) fragments; coatings of organic matter on sand grains; medium acid; gradual, wavy boundary.

B3—35 to 50 inches, dark-brown (10YR 3/3) sand; weak, fine, granular structure; friable; common, fine and medium, distinct, weakly cemented, dark reddish-brown (5YR 2/2) fragments; slightly acid; many uncoated sand grains; gradual, wavy boundary.

A'2g—50 to 55 inches, dark-gray (10YR 4/1) sand; common, medium and coarse, faint, light brownish-gray (10YR 6/2) mottles; single grain; loose; slightly acid; abrupt, wavy boundary.

B'2tg—55 to 61 inches, light brownish-gray (10YR 6/2) sandy clay loam; weak, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; few, fine, faint, light-gray sand streaks; slightly acid; gradual, wavy boundary.

C—61 to 84 inches, lenses and pockets of light brownish-gray (10YR 6/2) sand, loamy sand, and sandy loam; few, fine, distinct, yellowish-brown mottles; massive; loose to firm; slightly acid.

EauGallie soils are extremely acid to strongly acid in the A horizon. The Bh, B3, and A'2g horizons are strongly acid to neutral. The B'2tg and C horizons are medium acid to moderately alkaline.

The A horizon is sand or fine sand and is less than 30 inches thick. The A1 horizon is dark gray to black when rubbed. Where this layer is dark gray, it is 4 to 10 inches thick. Where it is very dark gray or black, it is no more than 8 inches thick. The A2 horizon is gray to light gray and is 8 to 26 inches thick. Few to many streaks of the A1 horizon extend along root channels into the A2 horizon.

The B2h horizon is black to dark reddish-brown sand or fine sand 11 to 18 inches thick. It has an organic-matter content of 1 to 6 percent. The B3 horizon is brown to dark grayish-brown sand or fine sand 6 to 18 inches thick. It contains few to many, dark reddish-brown fragments that are similar to the materials in the B2h horizon.

The A'2g horizon of gray to dark-gray sand or fine sand does not occur in all profiles, and the Bh horizon rests directly on the B'2tg horizon.

The B'2tg horizon begins at a depth of 40 to 60 inches. It is sandy loam, fine sandy loam, or sandy clay loam and is light gray, and light brownish gray to light yellowish brown and has few to common yellowish, reddish, or brownish mottles. In most profiles this horizon has few to many streaks of sand, fine sand, loamy sand, or loamy fine sand.

The C horizon is a layer of many lenses and pockets of sand, loamy sand, and sandy loam, or fine sand, loamy fine sand, and fine sandy loam.

EauGallie soils are associated with Felda, Floridana, Immokalee, Malabar, Myakka, Oldsmar, Pineda, Pompano, and Wabasso soils. They have a B2h horizon that is lacking in Felda, Floridana, Malabar, Oldsmar, Pineda, and Pompano soils. They are better drained than Floridana soils and lack the thick, black A1 horizon of those soils. They are similar to Immokalee and Myakka soils, but in contrast have a loamy B't horizon between depths of 40 and 60 inches. Depth to B2h horizon is less than 30 inches in EauGallie soils, but more than 30 inches in Oldsmar soils. Depth to the B't horizon is less than 60 inches in EauGallie soils, but more than 40 inches in Wabasso soils.

EauGallie sand (Eg).—This is a nearly level, poorly drained soil on broad, low ridges in the flatwoods. It has the profile described as representative of the series. In most years the water table is within a depth of 10 inches for 1 to 4 months and between 10 and 40 inches for more than 6 months. In dry seasons it is below a depth of 40 inches. This soil is flooded for 7 days to a month once in 5 years to 20.

Included with this soil in mapping are areas where the organic-stained layers are lighter colored and more weakly cemented than is typical. Also included are a few areas of EauGallie fine sand and small areas of Malabar, Myakka, Oldsmar, Pineda, and Wabasso soils.

The natural vegetation is open forest of second-growth slash pine and an understory of saw-palmetto, runner oak, native grass, some gallberry, and scattered cabbage palm. Much of the acreage is still in natural vegetation and commonly is used for range. Areas near the flood plains of the river generally are covered with scattered live oak and dense stands of pine and cabbage palm. The hammocks of dense pine and cabbage palm make good shelter for cattle and wildlife.

Unless drained, bedded, irrigated, and properly managed, this soil is poorly suited to citrus. If drainage and water control are adequate, it is well suited to improved pasture grasses and clover, vegetable crops, lawn grasses,

and many kinds of ornamental plants. Capability unit IVw-2; Acid Flatwoods range site; woodland group 10.

EauGallie sand, bedded (Eu).—This is a low, nearly level, poorly drained soil that has been bedded for citrus. The water table has been lowered by drainage and is at a depth of about 10 to 40 inches for 2 to 6 months a year. This soil is similar to EauGallie sand, but it has been reshaped into beds and ditches. On about half the acreage the sandy layers above the weakly cemented layers are a few inches thicker than is typical of EauGallie soils because material from ditches has been spread over the soil surface. The bed tops are about 30 feet wide. They are separated by shallow ditches that have sloping sides. The ditches are about 30 feet wide and 28 to 30 inches deep.

Included with this soil in mapping are small areas of Floridana, Malabar, Pineda, and Wabasso soils that have been bedded.

The natural vegetation of open forest of pine and an understory of saw-palmetto and grasses was destroyed when this soil was bedded. Complex drainage systems have been installed, and almost all areas are in citrus. Capability unit IVw-2; not assigned to range site or woodland group.

EauGallie, Winder, and Felda soils, ponded (Ew).—This mapping unit is about 40 percent EauGallie soils, 20 percent Winder soils, 20 percent Felda soils, and 20 percent other soils. One or more of these soils occupies at least 70 percent of any particular area, but the proportion varies from place to place. These soils are in shallow ponds and sloughs in the flatwoods.

Included with these soils in mapping are small areas of Chobee, Floridana, Holopaw, and organic soils.

The depressions or shallow ponds and sloughs receive runoff from the surrounding soils and are flooded for more than 6 months in most years. Some areas are flooded the entire year if rainfall is heavy. In the lowest places water is 2 or more feet deep.

Most areas are in natural vegetation of cypress and water-tolerant grasses, such as maidencane and St.-Johnswort. Many are used for range during the drier periods. These soils are not suited to citrus, vegetable crops, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants.

An adequate drainage system is difficult to establish because in most places suitable outlets are not available. In their native state, these soils provide watering places and some grazing for cattle. They are important feeding grounds for many kinds of wading birds and other wildlife. Capability unit VIw-1; Sand Pond range site; woodland group 7.

Felda Series

The Felda series consists of nearly level, poorly drained sandy soils on broad low flats and in sloughs, poorly defined drainageways, depressions, and cypress ponds. These soils formed in stratified, sandy and loamy marine materials.

In a representative profile the surface layer is sand about 5 inches thick. The upper 2 inches is very dark brown, and the next 3 inches is black. Below this is 10 inches of dark-gray sand that has common dark grayish-brown mottles and 15 inches of mottled grayish-brown sand. The next layer, between depths of 30 and 41 inches, is dark-gray sandy loam that has dark yellowish-brown mottles and common light brownish-gray sand streaks. Below this layer, to a depth of 62 inches, is gray sandy loam that has common yellowish-brown and dark yellowish-brown mottles in the lower part and streaks and lenses of sand and loamy sand.

Permeability is rapid in the sandy layers and moderate to moderately rapid in the loamy layers. The available water capacity is very low in the sandy layers and moderate in the loamy layers. Organic-matter content is low, and natural fertility is moderately low.

Representative profile of Felda sand in a pasture on the Duda Ranch about 190 feet north of a farm road, SE¼SE¼ sec. 35, T. 25 S., R. 35 E.:

A11—0 to 2 inches, very dark brown (10YR 2/2) sand; moderate, fine, granular structure; friable; many fine roots; high organic-matter content; slightly acid; clear, smooth boundary.

A12—2 to 5 inches, black (10YR 2/1) sand; many, medium, distinct, dark-gray (10YR 4/1) streaks and lenses; weak, fine, granular structure; friable; many fine roots; slightly acid; clear, wavy boundary.

A21—5 to 15 inches, dark-gray (10YR 4/1) sand; common, medium, faint, dark grayish-brown (10YR 4/2) mottles; single grain; loose; common fine roots; slightly acid; clear, wavy boundary.

A22—15 to 30 inches, grayish-brown (2.5Y 5/2) sand; common, medium, distinct, gray (10YR 6/1) mottles and streaks and few, medium, distinct, yellowish-brown (10YR 5/4) mottles; single grain; loose; few fine roots; neutral; abrupt, wavy boundary.

B2tg—30 to 41 inches, dark-gray (10YR 4/1) sandy loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; slightly sticky; few fine roots; few medium pores; sand grains coated and bridged with silicate clays; common, coarse, prominent light brownish-gray (10YR 6/2) sand streaks; mildly alkaline; clear, wavy boundary.

B3g—41 to 49 inches, gray (10YR 5/1) sandy loam; massive; friable, slightly sticky; common lenses and streaks of sand and loamy sand; mildly alkaline; clear, wavy boundary.

Cg—49 to 62 inches, gray (10YR 5/1) sandy loam; massive; friable; common, medium, distinct mottles of yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4); many streaks and lenses of sand and loamy sand; mildly alkaline.

Felda soils are slightly acid to moderately alkaline throughout the profile, with the exception of the A1 horizon that is strongly acid to mildly alkaline.

The A1 horizon is very dark brown or black to gray, and is 3 to 6 inches thick. The A2 horizon is dark grayish brown to grayish brown or dark gray to light gray and is 17 to 34 inches thick. It has common mottles in shades of brown or gray and contains streaks of material from the A1 horizon. The entire A horizon is 20 to 40 inches thick.

The B2tg horizon is dark-gray, dark grayish-brown, olive-gray, or light-gray sandy loam to sandy clay loam 6 to 18 inches thick. It contains few to common sand streaks and few to common yellow or brown mottles. The B3g horizon is similar to the B2tg horizon in color, but contains more lenses and pockets of sand or loamy sand. In some places it is mottled.

The Cg horizon generally is gray or light-gray sand to sandy loam. Where it is a sandy loam it contains many pockets and lenses of sand and loamy sand. It contains shell fragments in some places. The fragments are more numerous in the lower part.

Felda soils are associated with Anclote, EauGallie, Montverde, Pineda, Pompano, Terra Ceia, Wabasso, and Winder soils. They are better drained than Anclote, Montverde, and Terra Ceia soils. They lack the thick black A1 horizon of Anclote soils, the B2h horizon of EauGallie and Wabasso soils, and the B2ir horizon of Pineda soils. They have a B horizon, which Anclote or Pompano soils lack. Felda soils are

mineral soils, and Montverde and Terra Ceia soils are organic. Depth to the B horizon is between 20 and 40 inches in Felda soils and less than 20 inches in Winder soils.

Felda sand (Fa).—This is a nearly level, poorly drained soil on broad, low flats and in sloughs, depressions, and poorly drained drainageways. It has the profile described as representative of the series. The water table is within a depth of 10 inches for 2 to 6 months in most years and is typically between 10 and 40 inches the rest of the year. Water rises above the surface for 2 to 7 days in 1 to 3 months of each year. Depressions are flooded for more than 6 months in most years.

Included with this soil in mapping are areas where the texture is fine sand and small areas of Floridana, Holopaw, and Winder soils. Also included are a few areas, at slightly higher elevations, that have a weak organic-stained layer above the subsoil.

A large part of the acreage is in natural vegetation of sand cordgrass and few to common, scattered cabbage palms. Slightly higher areas are in a forest of mixed pine and cabbage palm. Many areas in natural vegetation are used for range.

If drainage and water control is adequate, this soil is well suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IIIw-1; Fresh Marsh (mineral) range site; woodland group 11.

Felda sand, bedded (Fd).—This is a nearly level, poorly drained soil that has been bedded for citrus. It is in low-lying areas. The water table has been lowered by drainage and is between depths of 10 and 40 inches for 2 to 6 months a year. This soil is similar to Felda sand, but has been reshaped and reworked into beds and wide ditches (fig. 4). On about 20 percent of the acreage the sandy layers above the loamy subsoil are a few inches thicker than is typical of Felda soils because material from ditches has been spread over the original soil surface. The bed tops are about 30 feet wide. They are separated by shallow ditches that have sloping sides. The ditches are about 30 feet wide and 28 to 30 inches deep.

Included with this soil in mapping are many small areas of Floridana, Pineda, and Winder soils that have been bedded.

The natural vegetation of sand cordgrass and scattered cabbage palm was destroyed when the beds were built. Drainage systems have been installed, and this soil is well suited to citrus. Almost all areas are in citrus. Capability unit IIIw-1; not assigned to a range site or woodland group.

Figure 4.—A grove of orange trees planted on Felda sand, bedded. Ditches facilitate drainage of this poorly drained soil. Bedding increases the distance above the water table so that the root zone is enlarged.

Felda and Winder soils (Fe).—These are poorly drained soils in low, broad, grassy sloughs that have many slightly higher hammocks ranging from a few feet in diameter to about 15 acres in size.

About 65 percent of the mapping unit is sloughs and 35 percent is hammocks, but this proportion is variable and in some places is reversed. The overall composition of the sloughs is about 35 percent Felda soils and 30 percent Winder soils. Chobee, Floridana, Wabasso, and other soils are also in the sloughs, but no one soil makes up more than 20 percent of an area.

Hammocks are about 55 percent of a soil that is similar to Wabasso soils, but has a thick dark-colored surface layer and the loamy layers overlie limestone. Other significant soils in the hammocks are similar to Copeland soils. All of the soils in the sloughs and hammocks occur without regular pattern and are so intricately intermixed that it was impractical to map them separately.

The water table in the sloughs is within a depth of 10 inches for 2 to 6 months in most years and is typically between depths of 10 and 40 inches the rest of the year. The water table is slightly deeper in the hammocks than in the sloughs. Water rises above the surface for 2 to 7 days in 1 to 3 months of each year.

The natural vegetation is marshgrass in the sloughs and cabbage palm, saw-palmetto, pine, and live oak in the hammocks. Almost all areas are in natural vegetation and are used mainly as range and wildlife habitat.

If drainage and water control are adequate, these soils are well suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IIIw-1; Slough range site; woodland group 11.

Felda and Winder soils, ponded (Fg).—These soils are in landward areas of former high tidal marsh and are now inside perimeter dikes built for water and mosquito control in wildlife management areas. Tidal influence has been eliminated, and during rainy periods fresh water accumulates in these areas. These soils are continuously flooded for 6 months or more in most years. Water becomes 12 inches deep or deeper in many areas, but commonly recedes to several inches below the surface in dry periods.

This mapping unit is about 50 percent Felda soils and 25 percent Winder soils, but the proportions vary from place to place. The other 25 percent is mainly small areas of Bradenton shallow variant, Floridana, Parkwood moderately fine subsoil variant, and Pineda soils.

The natural vegetation is salt-tolerant grasses, sedges, and ferns, but because areas have been diked, freshwater species, such as cattails, are becoming established. These soils are in natural vegetation. They are not suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants. An adequate drainage system is difficult to establish. No suitable outlets are available in most places. These soils are important feeding grounds for many kinds of wading birds and other wildlife. Capability unit VIw-1; Salt Marsh (mineral) range site; woodland group 7.

Floridana Series

The Floridana series consists of nearly level, very poorly drained soils in marshy depressions and on broad flood plains and broad flats. These soils formed in sandy and loamy marine sediments.

In a representative profile the surface layer is about 12 inches of black sand. It is underlain by about 17 inches of grayish-brown sand that has a few brownish-yellow and gray mottles. The subsoil between depths of 29 and 43 inches is dark-gray sandy clay loam mottled in shades of gray and brown. Below this, to a depth of 62 inches, it is gray sandy loam that contains common lenses and pockets of sandy clay loam, loamy sand, and sand.

Permeability is moderately rapid to a depth of about 12 inches, rapid from 12 to 29 inches, and moderate from 29 to 62 inches. The available water capacity is moderate in the surface layer, low in the next layer, and moderate in the loamy subsoil. Natural fertility and organic-matter content are moderate.

Representative profile of Floridana sand in a marsh about 1 mile north of State Route No. 50 and about 1¾ miles west of the junction of Interstate Highway No. 95 and State Route No. 50, NW¼SW¼ sec. 24, T. 22 S., R. 34 E.:

A11—0 to 7 inches, black (N 2/0) sand; weak, medium, granular structure; friable; common fine and few medium roots; sand grains coated with organic material; slightly acid; gradual, smooth boundary.

A12—7 to 12 inches, black (10YR 2/1) sand; weak, fine, granular structure; friable; common fine roots; many, fine and medium, faint, gray (10YR 5/1) sand pockets and streaks; slightly acid; clear, wavy boundary.

A2—12 to 29 inches, grayish-brown (2.5Y 5/2) sand; few, medium, prominent, brownish-yellow (10YR 6/6) mottles and common, coarse, faint, gray (10YR 5/1) mottles; single grain; loose; common medium roots; slightly acid; clear, wavy boundary.

B2tg—29 to 38 inches, dark-gray (10YR 4/1) sandy clay loam; common, coarse, faint, light brownish-gray (10YR 6/2) mottles and few, medium, faint, gray (10YR 5/1) mottles; weak, coarse, subangular blocky structure; firm, slightly plastic; common fine and medium roots; few medium and fine pores; sand grains coated and bridged with clay; mildly alkaline; gradual, wavy boundary.

B31g—38 to 43 inches, dark-gray (N 4/0) sandy clay loam; weak, coarse, subangular blocky structure; slightly firm; common fine and medium roots; common fine and medium lenses of gray (10YR 5/1) sandy loam; channels filled with light brownish-gray (10YR 6/2) sand; few fine and medium pores; many uncoated sand grains; mildly alkaline; clear, wavy boundary.

B32g—43 to 62 inches, gray (10YR 5/1) sandy loam; common pockets of coarse, faint, dark-gray (N 4/0) sandy clay loam; massive; friable; common medium and coarse lenses and pockets of sand and loamy sand; mildly alkaline.

Floridana soils are slightly acid or neutral in the A1 horizon, slightly acid to mildly alkaline in the A2 horizon, and neutral to moderately alkaline in the B horizon.

The A1 horizon is black or very dark gray, is 10 to 22 inches thick, and has an organic-mattter content of 2 to 18 percent. In most profiles it contains light-colored pockets or streaks of sand. The A2 horizon is grayish brown to light gray and contains a few mottles in gray and yellow in most places. Some profiles have no A2 horizon, and the A1 horizon rests directly on the B2tg horizon. Thickness of the entire A horizon ranges from 20 to 40 inches.

The B2tg horizon is dark-gray to light-gray sandy loam to sandy clay loam but is dominantly sandy clay loam. In most profiles it contains common mottles of lighter gray, yellow, and brown. Depth to the B2tg horizon is 20 to 40 inches. The B3g horizon is dark-gray to light-gray sandy loam or sandy clay loam that contains lenses and pockets

of sand, loamy sand, or sandy loam. It contains few to many shells in some places.

Floridana soils are associated with Anclote, Felda, Malabar, Pineda, Pompano, Terra Ceia, and Winder soils. They have a loamy B2tg horizon, and Anclote and Pompano soils are sandy to a depth of 80 inches or more. They are more poorly drained than Felda, Malabar, Pineda, Pompano, and Winder soils and have a thick, dark-colored A1 horizon, which those soils lack. Depth to the loamy B2tg horizon is within 20 to 40 inches in Floridana soils but less than 20 inches in Winder soils. Floridana soils lack the B2ir horizon of Malabar and Pineda soils. They are mineral soils, and Terra Ceia soils are organic.

Floridana sand (Fn).—This is a nearly level, very poorly drained soil that has a surface layer of thick black sand. It is in broad areas on flood plains and in small to large marshy depressions. This soil has the profile described as representative of the series. The water table is within a depth of 10 inches for 6 to 9 months in most years and is typically between 10 and 30 inches the rest of the year. Water rises above the surface 2 to 7 days in 1 to 6 months of each year.

Included with this soil in mapping are areas of soils similar to Floridana sand, but are black or very dark gray to depths of 24 to 50 inches. These areas are in cypress ponds and grassy marshes and are higher in organic-matter content than this Floridana soil. Also included are small areas of Felda sad, Tomoka muck, and Chobee sandy loam and areas of a soil similar to this Floridana soil, but its subsoil begins at a depth below 40 inches.

A large part of the acreage is in natural vegetation of sand cordgrass and is used for range. A few areas are covered with cypress or hardwoods.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is poorly suited to citrus. Capability unit IIIw-2; Fresh Marsh (mineral) range site; woodland group 14.

Floridana, Chobee, and Felda soils, flooded (Fo).—These soils are on broad flats of flood plains that are frequently flooded. The water table is within a depth of 10 inches most of the time. Most areas are continuously flooded for 3 to 6 months or more each year.

Floridana, Chobee, and Felda soils make up about 80 percent of any one area. The average composition of the mapping unit is about 36 percent Floridana soils, 27 percent Chobee soils, and 17 percent Felda soils, but the proportion of each varies considerably from place to place. About 20 percent is Anclote, Holopaw, Pompano, and Tomoka soils and soils that are similar to Chobee soils, but have a clayey texture.

Most areas are in natural vegetation of sand cordgrass. Woody bushes, such as wax myrtle, are growing in places. These soils are not suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants without major reclamation works that remove the hazard of flooding. Many areas are used for native pasture and range. Capability unit VIIw-1, Fresh Marsh (mineral) range site; not assigned to a woodland group.

Galveston Series

The Galveston series consists of nearly level, well-drained sandy soils on moderately broad ridges interspersed with long narrow sloughs. These soils formed in sandy marine sediments that have been reworked by wind and wave action.

In a representative profile the surface layer is gray sand about 5 inches thick. The next layer is pale-brown sand to a depth of 33 inches and light-gray sand to a depth of 80 inches. All layers contain a few marine shell fragments.

Permeability is very rapid throughout, and the available water capacity is very low in all layers. Organic-matter content and natural fertility are low.

Representative profile of Galveston sand in an area within the city limits of Satellite Beach and along the west side of State Route No. A1A:

A1—0 to 5 inches, gray (10YR 6/1) sand; single grain; loose; few fine and medium roots; few multicolored shell fragments; mildly alkaline; gradual, smooth boundary.

C1—5 to 38 inches, pale-brown (10YR 6/3) sand; single grain; loose; few medium roots; few multicolored shell fragments; mildly alkaline; gradual, wavy boundary.

C2—38 to 80 inches, light-gray (10YR 7/2) sand; single grain; loose; few fine shell fragments; mildly alkaline.

Galveston soils generally are neutral to moderately alkaline throughout the profile, but in some areas affected by salt spray from the ocean, they are strongly alkaline. A few multicolored shell fragments occur throughout the profile, and the silt and clay content is very low.

The A1 horizon is gray to pale brown and is 2 to 8 inches thick. The C horizon is pale brown to white to a depth of 80 inches or more.

Galveston soils are associated with Palm Beach and Welaka soils. They have a water table nearer the surface, are lighter colored, and contain fewer shell fragments than Palm Beach soils. They do not have the B2ir horizon that is typical of Welaka soils.

Galveston-Urban land complex (Ga).—The soils in this complex are well-drained Galveston sand and sandy soils that consist of reworked and leveled sandy materials that resemble Galveston sand. The water table generally is below a depth of 60 inches; it is between 40 and 60 inches for short periods during the rainy season.

Most of this complex is in urban areas where 25 to 40 percent of the surface area is covered with buildings or pavement. Originally the areas were long narrow ridges of Galveston sand, as described in the representaive profile, interspersed with long narrow parallel sloughs of poorly drained and very poorly drained soils. The sloughs have been filled with a variety of sandy materials and leveled. Some fill material was brought in by dredge or truck, and some came from bulldozing the upper layers of adjacent Galveston soils into the low places.

Included with this complex in mapping are small areas of Canaveral, Pomello, and Welaka soils that, if combined, are seldom more than 15 percent of any area.

Galveston-Urban land complex is poorly suited to lawn grasses and most kinds of ornamental plants. Not assigned to a capability unit, range site, or woodland group.

Holopaw Series

The Holopaw series consists of nearly level, poorly drained soils on broad river flood plains and low-lying flats and in poorly defined drainageways and small de-

pressions. These soils formed in stratified, sandy and loamy marine materials.

In a representative profile the surface layer, about 7 inches thick, is sand that is very dark gray in the upper 2 inches and dark gray in the next 5 inches. The next layer is sand about 38 inches thick. The upper 11 inches is grayish brown and is mottled with gray and yellowish brown; the next 17 inches is mottled in shades of gray and brown; and the lower 10 inches is gray. The subsoil, about 17 inches thick, is gray sandy loam that is mottled with shades of gray and brown and contains pockets and streaks of loamy sand and sandy clay loam in the lower part. Below this, to a depth of 71 inches, is gray loamy sand that contains pockets and lenses of sand.

Permeability is rapid to a depth of about 45 inches, moderately rapid from 45 to 62 inches, and rapid from 62 to 71 inches. The available water capacity is very low in the upper sandy layers, moderate in the loamy layers, and low to very low in the lower 9-inch sandy layer. Natural fertility and organic-matter content are low.

Representative profile of Holopaw sand in a native pasture about 30 feet west of a poor motor road and about 3.5 miles north of State Route No. 520, NW¼ NW¼ sec. 9, T. 24 S., R. 35 E.:

A11—0 to 2 inches, very dark gray (10YR 3/1) sand; weak, fine, granular structure; very friable; many fine and medium roots; color is mixture of light-gray sand grains and black organic matter; slightly acid; gradual, smooth boundary.

A12—2 to 7 inches, dark-gray (10YR 4/1) sand; weak, fine, granular structure; very friable; many fine roots; slightly acid; gradual, smooth boundary.

A21g—7 to 18 inches, grayish-brown (10YR 5/2) sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles and many, fine and medium, faint, gray to light gray (10YR 6/1) streaks; single grain; loose; common fine roots; slightly acid; gradual, smooth boundary.

A22g—18 to 35 inches, coarsely mottled gray (10YR 6/1) and grayish brown (10YR 5/2) sand; few, fine, distinct, very pale brown (10YR 7/4) mottles and few, medium, distinct, black (10YR 2/1) streaks along root channels; single grain; loose; few fine roots; slightly acid; gradual, smooth boundary.

A23g—35 to 45 inches, gray (10YR 6/1) sand; single grain; loose; few fine roots; neutral; abrupt, wavy boundary.

B2tg—45 to 58 inches, gray (10YR 5/1) sandy loam; common, fine, faint, light-gray mottles and common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; firm; few fine roots; clay bridging between sand grains; mildly alkaline; gradual, wavy boundary.

B3g—58 to 62 inches, gray (10YR 5/1) sandy loam; few, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; common pockets and streaks of loamy sand and sandy clay loam; mildly alkaline; gradual, wavy boundary.

Cg—62 to 71 inches, gray (5YR 5/1) loamy sand; massive; friable; common pockets and lenses of sand; mildly alkaline.

Holopaw soils are medium acid to neutral in the A horizon and neutral or mildly alkaline in the B and C horizons.

The A1 horizon is black or very dark gray to dark brownish gray and is 3 to 10 inches thick. The part of the A1 horizon that is very dark gray to black is less than 6 inches thick. The A2 horizon is grayish brown or gray to light gray and is 37 to 60 inches thick. It is mottled with shades of brown, gray, and yellow and contains streaks of material from the A1 horizon. The A horizon is sand or fine sand. It ranges from 40 to 70 inches in thickness, but is commonly 40 to 50 inches thick.

The B2tg horizon is dark grayish-brown or gray to light-gray sandy loam, fine sandy loam, or sandy clay loam 7 to 18 inches thick. It has mottles in shades of brown and yellow. Some profiles contain pockets, streaks, or lenses of sand and loamy sand, or fine sand and loamy fine sand. The B3g horizon is similar to the B2tg horizon in color and contains streaks and pockets of loamy fine sand or loamy sand and sandy clay loam.

The Cg horizon is gray sand to loamy fine sand and contains shell fragments in some places.

Holopaw soils are associated with Anclote, EauGallie, Felda, Pineda, and Tomoka soils. In contrast with the sandy Anclote soils, they are better drained, they do not have a thick, dark-colored A1 horizon, and they have a loamy B2tg horizon. They lack the B2h horizon that is typical of EauGallie soils and the B2ir horizon typical of Pineda soils. In contrast with Tomoka soils, they are mineral and those soils are organic. Depth to the B2tg horizon is below 40 inches in Holopaw soils and between 20 and 40 inches in Felda soils.

Holopaw sand (Ho).—This is a nearly level, poorly drained soil in broad flat areas on river flood plains and in small depressions and poorly defined drainageways. The water table is within a depth of 10 inches for 2 to 6 months in most years and is typically between 10 and 30 inches the rest of the year. Many areas are continuously flooded for 1 to 3 months each year.

Included with this soil in mapping are small areas of Felda sand and in some places areas of similar soils that have a light-gray surface layer. Also included are a few scattered areas of fine sand.

A large part of the acreage is in natural vegetation of sand cordgrass and scattered cabbage palm. In a few places there are many cabbage palms. Some areas are used for range.

If drainage and water control are adequate, this soil is moderately well suited to vegetables and well suited to pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is poorly suited to citrus. Capability unit IVw-1; Fresh Marsh (mineral) range site; woodland group 11.

Immokalee Series

The Immokalee series consists of nearly level, poorly drained sandy soils in broad areas in the flatwoods, on low ridges between sloughs, and in low narrow areas between sand ridges and lakes and ponds. These soils formed in beds of marine sands.

In a representative profile the surface layer, about 11 inches thick, is sand that is very dark gray in the upper 4 inches and dark gray in the next 7 inches. It is underlain by a layer of gray to light-gray sand 22 inches thick. The subsoil extends to a depth of 65 inches. The upper 16 inches is black sand; the next 6 inches is dark reddish-brown sand that is weakly cemented and contains sand grains well coated or stained with organic matter; and the lower 10 inches is dark-brown sand. Below this is yellowish-brown sand that extends to a depth of 80 inches.

Permeability is moderate to moderately rapid in the weakly cemented layers and rapid in all other layers. The available water capacity is moderate in the weakly cemented layers and very low in the surface and subsurface layers and from a depth of 55 to 80 inches. Organic-matter content and natural fertility are low.

Representative profile of Immokalee sand in a wooded area about 100 feet east of a poor motor road and about 0.9 mile west of the Florida East Coast Railroad, SE¼ SE¼ sec. 25, T. 23 S., R. 35 E.:

A11—0 to 4 inches, very dark gray (10YR 3/1, rubbed) sand; weak, fine, granular structure; very friable; many fine and few medium roots; color caused by mixing of light-gray sand grains and black organic matter; very strongly acid; gradual, smooth boundary.

A12—4 to 8 inches, dark-gray (10YR 4/1) sand; weak, fine, granular structure; loose; common fine and few medium roots; very strongly acid; gradual, wavy boundary.

A13—8 to 11 inches, dark-gray (10YR 4/1) sand; common, medium, faint, light-gray (10YR 6/1) splotches; single grain; loose; few fine and medium roots; very strongly acid; clear, wavy boundary.

A21—11 to 15 inches, gray (10YR 6/1) sand; common, medium, prominent, very dark brown (10YR 2/2) streaks along old root channels and decaying roots; single grain; loose; few fine and medium roots; very strongly acid; gradual wavy boundary.

A22—15 to 33 inches, light-gray (10YR 7/1) sand; common, medium, prominent, very dark brown (10YR 2/2) vertical streaks along old root channels and decaying roots; single grain; loose; few fine and medium roots; very strongly acid; abrupt, wavy boundary.

B21h—33 to 43 inches, black (N 2/0, unrubbed and 5YR 2/1, rubbed) sand; weak, coarse, subangular blocky structure; firm, weakly cemented; many to common fine and medium decaying roots; common uncoated sand grains; strongly acid; gradual, wavy boundary.

B22h—43 to 49 inches, black (N 2/0, unrubbed) and very dark brown (10YR 2/2, rubbed) sand; weak, medium, subangular blocky structure; firm, weakly cemented; few fine roots; very few uncoated sand grains; strongly acid; gradual, wavy boundary.

B23h—49 to 55 inches, dark reddish-brown (5YR 2/2) sand; weak, medium, granular structure; firm, weakly cemented; sand grains coated with organic matter; strongly acid; gradual, wavy boundary.

B3—55 to 65 inches, dark-brown (10YR 3/3) sand; common, medium, distinct, dark reddish-brown (5YR 2/2), thinly coated fragments; single grain; loose; strongly acid; gradual, wavy boundary.

C—65 to 80 inches, yellowish-brown (10YR 5/4) sand; single grain; loose; strongly acid.

Immokalee soils are dominantly strongly acid and very strongly acid in all horizons. They are slightly acid to mildly alkaline, however, in pastures and groves where alkaline artesian water has been used for irrigation.

The A1 horizon is dark-gray to black and is 2 to 12 inches thick. Where this layer is very dark gray or black, it is no more than 6 inches thick. The A2 horizon is gray to light gray and is 20 to 40 inches thick. Streaks of the A1 horizon extend into the A2 horizon. The entire A horizon ranges from 30 to 50 inches in thickness.

The B2 horizon is black to dark reddish-brown sand 4 to 24 inches thick. It has an organic-matter content of about 1 to 6 percent. The B3 horizon is brown or dark brown to dark grayish brown and is 6 to 12 inches thick. It contains common to few, reddish-brown, weakly cemented fragments.

The C horizon is yellowish-brown to white sand to a depth of 80 inches or more. In some profiles it has mottles or streaks of other colors.

Immokalee soils are associated with Bradenton shallow variant, EauGallie, Felda, Myakka, Pomello, St. Johns, Satellite, and Wabasso soils. They are similar to EauGallie, Myakka, St. Johns, and Wabasso soils, but are more than 30 inches deep over the dark-colored B2h horizon. They lack the loamy B't horizon that is typical of EauGallie and Wabasso soils. In contrast with Felda soils and the Bradenton shallow variant, they are sandy to a depth of 80 inches and do not have a loamy B2tg horizon. They are more poorly drained than Pomello and Satellite soils.

Immokalee sand (Im).—This is a nearly level, poorly drained sandy soil in broad areas in the flatwoods, on low ridges between sloughs, and in low, narrow areas between sand ridges and lakes and ponds. It has a dark-colored, weakly cemented layer below a depth of 30 inches. This layer is dark colored because the sand grains are coated with organic matter. In most years the water table is within a depth of 10 inches for 1 to 2 months. It is between 10 and 40 inches more than half the time, and during short, dry periods it is below 40 inches. The soil is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of St. Johns, Myakka, and Oldsmar soils and a few areas of Basinger and Pompano soils in low places. Also included are a few areas of gently sloping Immokalee sand and some areas where the texture is fine sand.

The natural vegetation is saw-palmetto, gallberry, longleaf and slash pine, and wiregrass (pineland threeawn). Much of the acreage is in natural vegetation and commonly is used for range.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is poorly suited to citrus, but under the most favorable conditions and good management citrus can be grown. Some areas are in urban development. Capability unit IVw-2; Acid Flatwoods range site; woodland group 5.

Malabar Series

The Malabar series consists of nearly level, poorly drained sandy soils. These soils are in broad low areas and in sloughs, low depressions, and poorly defined drainageways. All formed in sandy and loamy marine sediments.

In a representative profile the surface layer is dark grayish-brown sand about 5 inches thick. Below this is 9 inches of light brownish-gray to pale-brown sand. The subsoil extends to a depth of 35 inches. The upper 4 inches is yellow sand that has common strong-brown mottles, the middle 6 inches is strong-brown sand, and the lower 11 inches is pale-brown sand. Below this is olive-gray sand to a depth of 45 inches, gray sandy clay loam that has common brownish mottles to a depth of 54 inches, gray sandy loam to a depth of 61 inches, and grayish-brown sand to a depth of 65 inches.

Permeability is rapid in all sandy layers and moderate in the loamy layers that extend from a depth of 45 to 61 inches. The available water capacity is very low in the sandy layers and moderate in the loamy layers. Natural fertility and organic-matter content are low.

Representative profile of Malabar sand in a wooded area about 1¼ miles south of junction of Interstate Highway No. 95 and U.S. Highway No. 192, SW¼SW¼ sec. 11, T. 28 S., R. 36 E.:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) sand; weak, fine, granular structure; friable; many fine and few medium roots; slightly acid; gradual, smooth boundary.

A21—5 to 11 inches, light brownish-gray (10YR 6/2) sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles and strong-brown (7.5YR 5/6) streaks along old root channels; single grain; friable; few

fine and medium roots; iron coatings on sand grains; slightly acid; gradual, wavy boundary.

A22—11 to 14 inches, pale-brown (10YR 6/3) sand; common, medium, faint, yellowish-brown (10YR 5/4) mottles; single grain; loose; few fine roots; medium acid; clear, wavy boundary.

B1ir—14 to 18 inches, yellow (10YR 7/6) sand; common, coarse, distinct, strong-brown (7.5YR 5/8) mottles; weak, fine, granular structure; friable; few fine roots; many uncoated sand grains; iron coatings on sand grains; medium acid; clear, wavy boundary.

B2ir—18 to 24 inches, strong-brown (7.5YR 5/8) sand; common, coarse, faint, yellowish-brown (10YR 5/8) mottles; weak, medium, granular structure; friable; iron coatings on sand grains; medium acid; clear, wavy boundary.

B3ir—24 to 35 inches, pale-brown (10YR 6/3) sand; common, coarse, faint, yellowish-brown (10YR 5/4) mottles; single grain; loose; nonsticky; iron coatings on sand grains; medium acid; clear, wavy boundary.

A'2—35 to 45 inches, olive-gray (5Y 5/2) sand; common, coarse, distinct, dark grayish-brown (10YR 4/2) mottles; single grain; loose; uncoated sand grains; slightly acid; abrupt, wavy boundary.

B'2tg—45 to 54 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; gradual, wavy boundary.

B'3g—54 to 61 inches, gray (10YR 5/1) sandy loam; few, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; common, coarse pockets of sand and sandy clay loam; massive; friable; neutral; clear, wavy boundary.

C—61 to 65 inches, grayish-brown (10YR 5/2) sand; single grain; loose; few, coarse, distinct pockets of gray (10YR 5/1) sandy clay loam; neutral.

Malabar soils are medium acid to moderately alkaline throughout.

The A1 horizon is black to dark grayish brown and is 4 to 8 inches thick. Where this layer is dark gray or black, it is less than 7 inches thick. The A2 horizon is pale brown to brown or light brownish gray to light gray and is 8 to 18 inches thick. Common mottles and streaks in shades of brown and yellow are in this horizon. The entire A horizon is 12 to 26 inches thick.

The B1ir horizon is very pale brown to yellow or reddish yellow and is 2 to 6 inches thick. The B2ir horizon is strong brown to yellow and is 4 to 12 inches thick. Few to common mottles in shades of yellow, red, and brown are in this horizon in many places. The B3ir horizon is light yellowish brown to very pale brown sand, 10 to 15 inches thick.

The A'2 horizon is 9 to 24 inches thick and is dark grayish brown to olive gray.

The B'2tg horizon is at a depth of more than 40 inches. It is light gray to dark gray, contains few to common yellowish or brownish mottles, and ranges from sandy loam to clay loam. Pockets or lenses of sand or loamy sand are in some places. The B'3g horizon is sandy loam to sandy clay loam and generally contains more lenses and pockets of coarser or finer material than the B'2tg horizon.

The C horizon is gray or brownish-gray to grayish-brown sand that has few to many pockets or lenses of sandy loam and sandy clay loam. It contains shell fragments in places.

Malabar soils are associated with EauGallie, Felda, Floridana, Holopaw, Pineda, Pompano, Valkaria, and Wabasso soils. They have a B2ir horizon that is lacking in EauGallie, Felda, Floridana, Holopaw, Pompano, and Wabasso soils. They have a B'2tg horizon that is lacking in Pompano and Valkaria soils. They lack the B2h horizon that is typical of the EauGallie and Wabasso soils. They are better drained than Floridana soils. Depth to the B'2tg horizon is more than 40 inches in Malabar soils, but less than 40 inches in Pineda soils.

Malabar sand (Ma).—This is a nearly level, poorly drained soil in broad low areas, in sloughs, and in poorly defined drainageways. It has the profile described as representative of the series. In most years the water table is within a depth of 10 inches for 1 to 2 months. It is 10 to 40 inches below the surface most of the time. Sloughs, however, are flooded for 1 to 3 months in most years, and the water table is within a depth of 10 inches for 2 to 6 months. Other areas are flooded for 7 days to a month once in 1 to 5 years.

Included with this soil in mapping are small areas of Pineda or Holopaw soils and a few places where calcareous streaks are evident in the yellow layers of this Malabar sand. Also included are small areas where the surface layer is slightly darker colored and thicker and small areas where the yellow layer is below a depth of 30 inches.

Many of the broad low areas are open forest of scattered pine and cabbage palm and a ground cover of native grasses. Sloughs are in wetland grasses. Other areas are covered with thick stands of pine, some cabbage palm, and a few live oaks. Many areas are used for native range.

If drainage and water control are adequate, this soil is moderately well suited to vegetables. If water control is adequate, it is well suited to pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. This soil is poorly suited to citrus. Capability unit IVw-1; Sweet Fatwoods range site; woodland group 11.

Malabar, Holopaw, and Pineda soils (Mb).—This mapping unit is about 33 percent Malabar soils, 28 percent Holopaw soils, 20 percent Pineda soils, and 19 percent other soils. The proportion varies from place to place. These nearly level, poorly drained soils are in an intricately interwoven pattern of sloughs, low depressions, and low ridges. They are so intermixed, both in the sloughs and on the low ridges, that it is impractical to map them separately. Each is described under the heading of its respective series.

Included with these soils in mapping are areas of EauGallie, Felda, and Oldsmar soils.

Sloughs and low depressions are flooded for 1 to 3 months of the year, and the water table is within a depth of 10 inches for 2 to 6 months in most years. On the low ridges the water table generally is within a depth of 10 inches for 1 to 2 months of the year and between 10 and 40 inches the rest of the time.

Most areas are in natural vegetation. On low ridges the vegetation generally is an open forest of scattered pine and cabbage palm and an understory of saw-palmetto and native grasses. Other areas are in thick stands of mixed pine, some palm, and a few live oaks. The sloughs are in wetland grasses.

If water control and drainage are adequate, these soils are well suited to improved pasture, clover and lawn grasses, and many kinds of ornamental plants and are moderately well suited to vegetables. They are poorly suited to citrus. A large part of the acreage is used for range. Capability unit IVw-1; Sweet Flatwoods range site; woodland group 11.

Micco Series

The Micco series consists of nearly level, very poorly drained peat soils in broad depressions and in freshwater marshes and swamps. These soils formed in the

remains of fibrous nonwoody materials over sandy and loamy marine sediments.

In a representative profile the upper 30 inches is dark reddish-brown peat. The underlying material extends to a depth of 55 inches. The upper 8 inches is very dark gray sand, the middle 9 inches is dark-gray sandy clay loam that generally has yellow and brown mottles, and the lower 8 inches is gray sandy clay loam that contains lenses and pockets of sand and loamy sand.

Permeability is rapid in the organic layers and the sandy layer and moderate to moderately rapid in the loamy layers. The available water capacity is very high in the organic layers, low in the sandy layer, and high in the loamy layers. Organic-matter content is very high, and natural fertility is high.

Representative profile of Micco peat in a pasture about 6.3 miles west of the point where State Route No. 507 intersects with the Brevard-Indian River County line about 2 miles north of the county line and about 1.5 miles west of a farm road that is on a drainage canal in T. 30 S., R. 36 E.:

Oi1—0 to 21 inches, dark reddish-brown (5YR 2/2, unrubbed and rubbed) fibric material; about 80 percent fiber, 45 percent rubbed; massive; many fine roots; herbaceous fiber; sodium pyrophosphate extract white (10YR 8/2); very strongly acid (pH 4.5 in 0.01 M $CaCl_2$); gradual, smooth boundary.

Oi2—21 to 30 inches, dark reddish-brown (5YR 2/2) and very dark brown (10YR 2/2, rubbed) fibric material; about 70 percent fiber, 45 percent rubbed; massive; common fine roots; herbaceous fiber; sodium pyrophosphate extract light gray (10YR 7/2); estimated mineral content 15 percent; extremely acid (pH 4.2 in 0.01 M $CaCl_2$); clear, wavy boundary.

IIC1—30 to 38 inches, very dark gray (10YR 3/1, crushed) sand; weak, medium, granular structure; friable; slightly acid; abrupt, wavy boundary.

IIIC2g—38 to 47 inches, dark-gray (N 4/0) sandy clay loam; many, coarse, distinct, dark yellowish-brown (10YR 4/4) and common, coarse, distinct, grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; friable; few loamy sand streaks and pockets; mildly alkaline; gradual, wavy boundary.

IIIC3g—47 to 55 inches, gray (10YR 5/1) sandy clay loam; many, medium, faint, light-gray (10YR 7/1) mottles and common, medium, faint, white (10YR 8/1) calcareous mottles and streaks; massive; friable; common sand and loamy sand pockets and lenses; moderately alkaline.

Micco soils are extremely acid or very strongly acid in the Oi horizon. They are medium acid to mildly alkaline in the IIC1 horizon. They are slightly acid to moderately alkaline in the IIIC2g and the IIIC3g horizons.

The Oi horizon is black, dark reddish brown, very dark brown or dark brown and is 16 to 40 inches thick. Sixty-five to 90 percent of the layer is fiber before rubbing, and 40 to 80 percent is fiber after rubbing.

The mineral IIC1 horizon below the organic layers is gray to black and is 4 to 10 inches thick. Few to many organic pockets or balls are in this horizon in some profiles. The IIICg horizon is dark-gray to light-gray sandy loam or sandy clay loam. Streaks, pockets, and lenses of sand or loamy sand are in many profiles.

Micco soils are associated with Canova, Felda, Floridana, Montverde, Terra Ceia, and Winder soils. They have thicker organic layers than Canova soils and thinner organic layers than Montverde and Terra Ceia soils. They are organic soils, but Felda, Floridana, and Winder soils are mineral soils.

Micco peat (Mc).—This is a nearly level, very poorly drained peat underlain by mineral soil layers. It is in broad depressions, freshwater marshes, and swamps. The water table is within a depth of 10 inches for 9 to 12 months in most years, and water is above the surface each year for more than 6 months. During dry periods the water table is lower, but seldom falls below 30 inches.

Included with this soil in mapping are small areas of Canova peat. Also included are a few areas where the peat is 52 inches or more thick and a few areas where the surface layer is muck.

Most of the acreage is in natural vegetation of maidencane, sawgrass, cattails, flags, and spare to dense thickets of woody button bush. Some areas are used for range and improved pasture.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is not suited to citrus. Capability unit IIIw-4; Fresh Marsh (organic) range site; not assigned to a woodland group.

Montverde Series

The Montverde series consists of nearly level, very poorly drained organic soils in depressions and freshwater marshes and swamps. These soils formed in herbaceous organic material more than 52 inches thick.

In a representative profile the upper 48 inches is peat. It is black in the upper 9 inches, dark reddish brown in the next 22 inches, and black in the lower 17 inches. Between depths of 48 and 54 inches is very dark gray mucky peat. Below this is very dark gray sand to a depth of 61 inches and very dark gray sandy clay loam to a depth of 77 inches.

Permeability is rapid in the organic and sandy layers and moderate in the loamy layer. The available water capacity is very high in the organic layer, low in the sandy layer, and medium in the loamy layers. Organic-matter content is very high, and natural fertility is high.

Representative profile of Montverde peat in a drained but undeveloped freshwater marsh about 1 mile north of the junction of Micco Road and State Route No. 507 and about 6.5 miles west on Sottile Farm Road, SE¼ NW¼ sec. 12, T. 30 S., R. 36 E.:

Oi1—0 to 9 inches, black (5YR 2/1, rubbed and unrubbed) fibrous peat; massive; friable; many fine roots in upper 5 inches; estimated fiber content 80 percent unrubbed and 55 percent rubbed; sodium pyrophosphate extract white (10YR 8/2); strongly acid; gradual, wavy boundary.

Oi2—9 to 31 inches, dark reddish-brown (5YR 2/2, unrubbed) black (5YR 2/1, rubbed) fibrous peat; massive; friable; new fine roots; estimated fiber content 80 percent unrubbed and 75 percent rubbed; sodium pyrophosphate extract white (10YR 8/1); medium acid; gradual, wavy boundary.

Oi3—31 to 48 inches, black (10YR 2/1, rubbed and unrubbed) fibrous peat; massive; friable; few medium roots; estimated fiber content 80 percent unrubbed and 75 percent rubbed; sodium pyrophosphate extract white (10YR 8/2); medium acid; clear, wavy boundary.

Oe1—48 to 54 inches, very dark gray (10YR 3/1, unrubbed) black (10YR 2/1, rubbed) partly decomposed organic material; massive; friable, slightly sticky; estimated 40 percent fiber unrubbed and 25 percent rubbed and about 20 percent sand; sodium pyrophosphate extract pale brown (10YR 6/3); slightly acid; clear, wavy boundary.

IIC1g—54 to 61 inches, very dark gray (10YR 3/1) sand; many, coarse, distinct, gray (10YR 4/1) mottles; single grain; friable; neutral; clear, wavy boundary.

IIC2g—61 to 77 inches, very dark gray (10YR 3/1) sandy clay loam; massive; firm, sticky; mildly alkaline.

Montverde soils are very strongly acid to slightly acid in the Oi and Oe horizons and medium acid to mildly alkaline in the IICg horizon.

The Oi horizon is black, very dark gray, dark reddish brown, very dark brown, or dark brown and is 41 to 52 inches thick. Sixty-five to 90 percent of the layer is fibrous before rubbing and 40 to 80 percent after rubbing. The Oe horizon has colors similar to the Oi horizon and is 3 to more than 30 inches thick. Combined thickness of the Oi and Oe horizons is 52 to more than 80 inches. In some profiles the Oe horizon is underlain by other Oi horizons.

The IIC1g horizon is very dark gray to black and is 0 to 16 inches thick. It is underlain by the IIC2g horizon. This horizon is gray to black sandy loam to sandy clay loam. Some of the mineral layers contain shell fragments.

Montverde soils are associated with Canova, Felda, Floridana, Micco, Terra Ceia, and Winder soils. They have thicker layers of peat than Micco soils and much thicker layers than Canova soils. They are organic soils, but Felda, Floridana, and Winder soils are mineral soils. Their organic material is fibric, and that of Terra Ceia soils is sapric.

Montverde peat (Me).—This is a nearly level, very poorly drained, thick organic soil in depressions, marshes, and swamps. The water table is within a depth of 10 inches for 9 to 12 months in most years, and water stands on the surface each year for more than 6 months. In dry seasons the water table is lower, but seldom falls below a depth of 30 inches.

Included with this soil in mapping are small areas of Micco soils. Also included are areas that have a mucky surface layer.

Most of the acreage is in natural vegetation of maidencane, sawgrass, cattails, flags, and sparse to dense thickets of woody button bush. A few areas are used for range and for improved pasture.

If reclaimed from the native state by drainage and water control, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is not suited to citrus. Capability unit IIIw-4; Fresh Marsh (organic) range site; not assigned to a woodland group.

Myakka Series

The Myakka series consists of nearly level, poorly drained sandy soils in broad areas in the flatwoods, in depressions, and in areas between sand ridges and ponds and sloughs. These soils formed in beds of marine sands.

In a representative profile the surface layer is sand about 8 inches thick. The upper 4 inches is very dark gray, and the next 4 inches is dark gray. Beneath this is 14 inches of gray to light-gray sand. The upper part of the subsoil is weakly cemented sand 13 inches thick. It is black in the upper part and dark reddish brown in the lower part. The sand grains in this layer are coated with organic matter. The lower part of the subsoil is very dark grayish-brown sand about 11 inches thick. It contains few slightly cemented, dark reddish-brown fragments. Between depths of 46 and 57 inches is light brownish-gray to grayish-brown sand. Below that is light-gray sand to a depth of 63 inches.

Permeability is rapid in the sandy layers to a depth of about 22 inches, moderate from about 22 to 46 inches, and rapid from about 46 to 63 inches. Available water capacity is very low to low to a depth of about 22 inches and moderate from about 22 to 46 inches. Organic-matter content and natural fertility are low.

Representative profile of Myakka sand in a wooded area about 100 yards southwest of a poor motor subdivision road and about 1 mile east of Interstate Highway No. 95 and the EauGallie interchange, NE¼NE¼ sec. 23, T. 27 S., R. 36 E.:

A11—0 to 4 inches, very dark gray (10YR 3/1, rubbed) sand; weak, fine, granular structure; common fine and few medium roots; mixture of light-gray sand grains and black organic matter gives a salt-and-pepper appearance; very strongly acid; gradual, smooth boundary.

A12—4 to 8 inches, dark-gray (10YR 4/1, rubbed) sand; weak, fine, granular structure; very friable; common fine and few medium roots; very strongly acid; gradual, smooth boundary.

A21—8 to 12 inches, gray (10YR 5/1) sand; few, medium, distinct, light-gray (10YR 6/1) sand pockets; single grain; loose; common fine and few medium roots; very strongly acid; clear, wavy boundary.

A22—12 to 22 inches, light-gray (10YR 6/1) sand; common, medium, distinct, dark-gray (10YR 4/1) vertical streaks along old root channels; single grain; loose; few medium and fine roots; very strongly acid; clear, wavy boundary.

B21h—22 to 28 inches, black (5YR 2/1) sand; weak, medium, granular structure; firm, weakly cemented, nonsticky; common fine roots; sand grains coated with organic matter; many clear sand grains; upper ½ to 1 inch is transitional with many, medium, distinct, dark-gray (10YR 4/1) streaks; strongly acid; clear, wavy boundary.

B22h—28 to 35 inches, dark reddish-brown (5YR 3/2) sand; weak, fine, granular structure; firm to friable, weakly cemented; sand grains coated with organic matter; strongly acid; gradual, wavy boundary.

B3—35 to 46 inches, very dark grayish-brown (10YR 3/2) sand; few, medium, distinct, dark reddish-brown (5YR 3/3), weakly cemented fragments; single grain; loose; many uncoated sand grains; strongly acid; clear, wavy boundary.

C1—46 to 51 inches, light brownish-gray (2.5Y 6/2) sand; common, coarse, distinct, very dark grayish-brown (10YR 3/2) sand streaks in old root channels; single grain; loose; many uncoated sand grains in dark streaks; strongly acid; clear, wavy boundary.

C2—51 to 57 inches, grayish-brown (2.5Y 5/2) sand; single grain; loose; strongly acid; clear, wavy boundary.

C3—57 to 63 inches, light-gray (10YR 6/1) sand; single grain; loose; strongly acid.

Myakka soils are strongly acid to extremely acid in the A and Bh horizons. In pastures and groves where alkaline artesian water is used for irrigation, these horizons are slightly acid to mildly alkaline. The B3 and C horizons are slightly acid to very strongly acid.

The A1 horizon is dark gray to black and is 4 to 8 inches thick. The A2 horizon is gray to light gray and is 2 to 22 inches thick. Few to many streaks of the A1 horizon extend into the A2 horizon. The entire A horizon is 8 to 30 inches thick. A transitional horizon ½ inch to 1½ inches thick is common between the A and Bh horizons. This horizon is grayish brown, brown, or black and has many uncoated sand grains.

The B2h horizon is black to dark reddish brown and is 6 to 20 inches thick. The organic-matter content of the B2h horizon is 1 to 7 percent. The B3 horizon is 6 to 12 inches thick and is brown to very dark grayish brown. It contains few to many dark reddish-brown, weakly cemented fragments.

The C horizon is grayish brown, yellowish brown, and light brownish gray to white. Mottles or streaks of other colors are in this horizon in some profiles.

Myakka soils are associated with EauGallie, Holopaw, Immokalee, Pineda, Pomello, St. Johns, and Wabasso soils.

They do not have the loamy B horizon that is characteristic of EauGallie and Wabasso soils. Their B2h horizon is at a depth of less than 30 inches, whereas the B2h horizon in Immokalee and Pomello soils is lower than 30 inches. In contrast with Holopaw soils, they have a B2h horizon, but do not have a loamy B2tg horizon. In contrast with Pineda soils, they have a B2h horizon but do not have a B2ir horizon. They have a thinner A1 horizon than St. Johns soils.

Myakka sand (Mk).—This is a nearly level, poorly drained sandy soil in broad areas in the flatwoods and in areas between sand ridges and sloughs and ponds. It has the profile described as representative of the series. In most years the water table is within a depth of 10 inches for 1 to 4 months and between 10 and 40 inches for more than 6 months. In dry seasons it is below a depth of 40 inches. The soil is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of Immokalee and St. Johns sands; some areas of Myakka fine sand; a few areas that contain loamy material below the weakly cemented layer; and small areas where the substratum is coquina rock. Also included are areas on the coastal ridge where sand and shells are below the weakly cemented layers.

A large part of the acreage is in natural vegetation of open forest of second-growth longleaf or slash pine and an understory of saw-palmetto, runner oak, native grass, and, in places, gallberry. Some areas are used for range.

If drainage, water control, and irrigation are adequate, this soil is moderately well suited to vegetables. Unless conditions are favorable, management is good, and a water control system is properly designed, it is poorly suited to citrus. If water control is adequate, it is well suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Some areas near expanding population centers have been developed for urban uses. Capability unit IVw-2; Acid Flatwoods range site; woodland group 5.

Myakka sand, ponded (Mp).—This is a nearly level, poorly drained, sandy soil in shallow depressions in the flatwoods. Most areas are small; only a few are larger than 50 acres. This soil is similar to Myakka sand, but it is in low places where water accumulates. In most years it is flooded (fig. 5) for 6 to 12 months.

Included with this soil in mapping are small areas of Basinger, St. Johns, EauGallie, and Holopaw soils.

Most areas are still in natural vegetation of maidencane or St.-Johnswort. Clumps of water-tolerant trees are in some places. Water lilies and flags are in places where standing water is deepest.

This soil is not suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, or most kinds of ornamental plants. An adequate drainage system is difficult to establish because in most places suitable outlets are not available. In their native state these soils pro-

Figure 5.—**An area of Myakka sand, ponded. This soil is flooded for 6 to 12 months of most years.**

vide watering places and some grazing for cattle. They are important feeding grounds for many kinds of wading birds and other wetland wildlife. Capability unit VIIw–2; Sand Pond range site; woodland group 7.

Myakka-Urban land complex (Mu).—This complex is 40 to 55 percent Myakka soil, 25 percent a Myakka soil that has been altered for use as building sites or covered by streets and buildings, and 20 to 45 percent Urban land or areas covered by houses, streets, driveways, buildings, parking lots, and other related construction. The open areas of Myakka soils are mostly in lawns, vacant lots, or playgrounds. These areas generally are so small and interspersed with Urban land that it was impractical to map them separately.

Included with these soils in mapping are small areas of Immokalee, Pomello, EauGallie, and Tavares soils. These areas make up about 15 percent of mapped areas. Also included are a few small areas that are as much as 60 percent or as little as 15 percent Urban land.

The soil has not been reworked as much in the older communities as in the newer, more densely populated ones. Streets that have been excavated below the original land surface and that have spread the soil material over adjacent areas are common. Most low areas have been filled with material from ditches or with material that has been hauled in.

This complex is well suited to lawn grasses and many kinds of ornamental plants. Most areas have had permanent drainage systems installed. In these areas the water table generally is between depths of about 20 and more than 40 inches. Not assigned to a capability unit, range site, or woodland group.

Oldsmar Series

The Oldsmar series consists of nearly level, poorly drained sandy soils on low ridges in the flatwoods and on low knolls on the flood plains. These soils formed in sandy marine sediments over loamy material.

In a representative profile the surface layer is sand about 11 inches thick; the upper 4 inches is black, and the next 7 inches is dark gray. Below this is 25 inches of gray to light-gray sand. The subsoil extends to a depth of 78 inches. The upper 8 inches is black sand. This layer is weakly cemented, and the sand grains are coated with organic matter. The next layer is about 7 inches of dark-brown sand that has common, weakly cemented, black fragments. The next 4 inches is brown sand, and the next 23 inches is grayish-brown sandy clay loam. Below this, to a depth of 93 inches, is stratified and mixed pockets and lenses of grayish-brown loamy sand, sandy loam, and sandy clay loam.

Permeability is rapid to a depth of about 36 inches and moderately rapid from about 36 to 93 inches. The available water capacity is very low to a depth of about 36 inches and moderate in all other layers. Organic-matter content and natural fertility are low.

Representative profile of Oldsmar sand in a wooded area about 100 feet east of State Route 507 and about 0.3 mile north of the junction of State Route 507 and State Route 514, NW¼SW¼ sec. 34, T. 28 S., R. 37 E.:

A11—0 to 4 inches, black (10YR 2/1, rubbed) sand; weak, fine, granular structure; very friable; common fine and few medium roots; strongly acid; clear, smooth boundary.

A12—4 to 11 inches, dark-gray (10YR 4/1) sand; single grain; loose; common fine roots; few medium roots; strongly acid; gradual, wavy boundary.

A21—11 to 19 inches, gray (10YR 5/1) sand; single grain; loose; few fine roots; few, medium, faint, dark-gray streaks; strongly acid; gradual, wavy boundary.

A22—19 to 36 inches, light-gray (10YR 6/1) sand; single grain; loose; few fine roots; few, medium, distinct, dark-gray (10YR 4/1) streaks; strongly acid; abrupt, wavy boundary.

B2h -36 to 44 inches, black (5YR 2/1) sand; moderate, medium, granular structure; friable, weakly cemented; common fine and medium roots; sand grains coated with organic matter; strongly acid; clear, wavy boundary.

B3&Bh—44 to 51 inches, dark-brown (10YR 3/3) sand; single grain; loose; very few fine roots; common, weakly cemented, black (10YR 2/1) fragments; many clean sand grains; strongly acid; clear, wavy boundary.

B3—51 to 55 inches, brown (10YR 5/3) sand; single grain; loose; common, medium, distinct, very dark brown (10YR 2/2) fragments; sand grains uncoated; slightly acid; abrupt, wavy boundary.

B'2t—55 to 66 inches, grayish-brown (2.5Y 5/2) sandy clay loam; few, medium, distinct, olive-brown (2.5Y 4/4) mottles; weak, coarse, subangular blocky structure; friable; sand grains coated and bridged with clay; few, medium, distinct, gray (10YR 6/1) pockets of uncoated sand; slightly acid; gradual, wavy boundary.

B'3—66 to 78 inches, grayish-brown (2.5Y 5/2) sandy clay loam; few, medium, distinct, olive-brown (2.5Y 4/4) mottles; massive; friable, slightly sticky; many pockets of sandy loam; many uncoated sand grains; slightly acid; gradual, wavy boundary.

C—78 to 93 inches, stratified and mixed pockets and lenses of grayish-brown (2.5Y 5/2) sandy clay loam, sandy loam, and loamy sand; massive; friable; slightly sticky; many uncoated sand grains; slightly acid; gradual, wavy boundary.

Oldsmar soils are very strongly acid to medium acid in the A, the Bh, and the B3&Bh horizons and slightly acid to mildly alkaline in all other horizons.

The A1 horizon is dark gray to black and is 4 to 12 inches thick. Where this layer is very dark gray or black, it is 4 to 8 inches thick. The A2 horizon is gray to light gray and is 18 to 36 inches thick. Streaks of the A1 horizon extend into the A2 horizon. The entire A horizon is 30 to 50 inches thick.

The B2h horizon is black to dark reddish-brown sand or fine sand 4 to 14 inches thick. It has an organic-matter content of 1 to 6 percent. The B3&Bh horizon is brown, dark-brown to dark grayish-brown sand or fine sand 6 to 18 inches thick. It contains common black or dark reddish-brown fragments. The B3 horizon is brown or dark-brown sand or fine sand. The B'2t horizon begins at a depth of more than 40 inches but less than 60 inches. It is light-gray, grayish-brown to dark yellowish-brown sandy loam to sandy clay loam and has few to common yellowish, reddish, or brownish mottles. In many places it contains lenses or pockets of sand or loamy sand. The B'3 horizon is similar to the B'2t horizon, but it contains many more lenses and pockets of coarse material.

The C horizon is stratified coarse-textured and fine-textured material.

Oldsmar soils are associated with EauGallie, Felda, Immokalee, Malabar, Myakka, Pineda, and Wabasso soils. They have a Bh horizon that is lacking in Felda, Malabar, and Pineda soils. They are underlain by loamy materials at a depth of 40 to 60 inches, and Immokalee soils are sandy to a depth of more than 60 inches. Depth to the Bh horizon is more than 30 inches in Oldsmar soils but less than 30 inches in EauGallie, Myakka, and Wabasso soils.

Oldsmar sand (Od).—This is a nearly level, poorly drained, sandy soil that is on low ridges in the flatwoods and on low knolls on the flood plains. In most years the

water table is within a depth of 10 inches for 1 to 3 months and between 10 and 40 inches for more than 6 months. In dry seasons it is below a depth of 40 inches. This soil generally is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of EauGallie and Wabasso soils, a few areas of Oldsmar sand that have strongly acid loamy layers, and a few areas where the surface layer is peat 4 to 12 inches thick. Also included are a few areas that are wetter for longer periods and are flooded for 1 to 2 months in most years.

Much of the acreage in the flatwoods is in natural vegetation of open forest of second-growth longleaf or slash pine and an understory of saw-palmetto, runner oak, and native grasses. Much of this acreage is used for range. Most of the acreage on low knolls on the river flood plains has been cleared and is in pasture.

Unless conditions are favorable, management is good, and a water control system is properly designed, this soil is poorly suited to citrus. If drainage and water control are adequate, it is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IVw-2; Acid Flatwoods range site; woodland group 10.

Orsino Series

The Orsino series consists of nearly level, moderately well drained sandy soils on moderately low ridges and between high ridges and poorly drained areas. These soils formed in thick deposits of sandy marine or eolian sand.

In a representative profile the surface layer is sand about 7 inches thick. The upper 4 inches is dark gray, and the lower 3 inches is gray. Below this is about 15 inches of light-gray fine sand. The subsoil extends to a depth of 69 inches. The upper 15 inches is yellowish-brown and brownish-yellow fine sand that has common light-gray tongues with very dark grayish-brown exteriors. The lower 32 inches is yellow fine sand that has strong-brown and very pale brown mottles. Below this, to a depth of 81 inches, is very pale brown fine sand.

Permeability is very rapid in all layers. The available water capacity is very low in all layers. The organic-matter content and natural fertility are low.

Representative profile of Orsino fine sand in a forested area about 200 feet northwest of the junction of U.S. Highway No. 1 and State Route 5A, NE¼SE¼ sec. 2, T. 20 S., R. 34 E.:

A11—0 to 4 inches, dark-gray (10YR 4/1) fine sand; single grain; loose; many fine, medium, and large roots; strongly acid; gradual, smooth boundary.

A12—4 to 7 inches, gray (10YR 5/1) fine sand; single grain; loose; common fine, medium, and large roots; strongly acid; gradual, wavy boundary.

A21—7 to 16 inches, light-gray (10YR 7/2) fine sand; single grain; loose; common fine, medium, and large roots; strongly acid; gradual, wavy boundary.

A22—16 to 22 inches, light-gray (10YR 7/2) fine sand; common, medium, distinct, yellowish-brown (10YR 5/4) and light yellowish-brown (10YR 6/4) mottles; single grain; loose; common medium roots and few large roots; strongly acid; tongues extend to a depth of 69 inches; abrupt, irregular boundary.

B21—22 to 28 inches, yellowish-brown (10YR 5/6) fine sand; single grain; loose; common medium roots, few fine and large roots; common tongues of light gray (10YR 7/1), 1 inch to 5 inches in diameter, with weakly cemented very dark grayish-brown (10YR 3/2) exteriors; discontinuous, weakly cemented, very dark grayish-brown, dark-brown (10YR 3/3), and brown (10YR 4/3) lenses, 0.5 inch to 3 inches wide, at upper contact of horizon; medium acid; gradual, wavy boundary.

B22—28 to 37 inches, brownish-yellow (10YR 6/6) fine sand; common, fine, faint, brownish-yellow mottles; single grain; loose; common medium roots; common tongues of light gray (10YR 7/1), 1 to 5 inches in diameter, with discontinuous, weakly cemented, very dark grayish-brown (10YR 3/2) exteriors, 0.25 to 1 inch wide; common, medium, prominent, dark-brown (10YR 3/3) mottles in tongues; medium acid; gradual, wavy boundary.

B3—37 to 69 inches, yellow (10YR 7/6) fine sand; common, medium, distinct, strong-brown (7.5YR 5/8) mottles, common, fine, prominent, red (2.5YR 5/6) mottles, and common, coarse, faint, very pale brown (10YR 7/3) mottles; single grain; loose; few tongues of light gray (10YR 7/1), 1 to 5 inches in diameter, with discontinuous, weakly cemented, very dark grayish-brown (10YR 3/2) exteriors 0.25 to 1 inch wide; medium acid; gradual, wavy boundary.

C—69 to 81 inches, very pale brown (10YR 7/4) fine sand; single grain; loose; many uncoated sand grains; medium acid; clear, wavy boundary.

Orsino soils are very strongly acid to medium acid throughout.

The A1 horizon is dark grayish brown, dark gray, or gray and is 2 to 8 inches thick. The A2 horizon is light gray to white and is 6 to 34 inches thick.

The B2 horizon is pale brown, strong brown, brownish yellow, yellowish brown, or yellow and is 12 to 50 inches thick. Few to common tongues of the A horizon extend into the B horizon in most profiles. These tongues have black to reddish-brown exteriors and light-gray to white interiors. Thin layers of brown or dark yellowish-brown fine sand are between the A2 and B horizons in some profiles. The B3 horizon is lighter colored than the B2 horizon and is reddish yellow to yellow. It contains common to many light-gray and very pale brown mottles or streaks.

The C horizon is light yellowish brown or very pale brown. This horizon extends to a depth of 80 inches or more. It is mottled in some places.

Orsino soils are associated with Astatula, Cocoa, Immokalee, Myakka, Paola, Pomello, and St. Lucie soils. They are more poorly drained than Astatula, Cocoa, Paola, and St. Lucie soils. They have a light-colored A2 horizon that is lacking in Astatula soils. In contrast with Cocoa soils, they are sandy to a depth of 80 inches and are not underlain by coquina rock. They have a yellowish B horizon instead of the white C horizon typical of St. Lucie soils. They differ from Immokalee, Myakka, and Pomello soils in not having a Bh horizon.

Orsino fine sand (Or).—This is a nearly level, moderately well drained sandy soil on moderately low ridges and between high ridges and poorly drained areas. In most years the water table is at a depth of 40 to 60 inches for 6 months or more. During prolonged dry periods it is below a depth of 60 inches, and during wet periods it is between 20 and 40 inches for 7 days to 1 month.

Included with this soil in mapping are small spots of Paola and Pomello soils. Also included are a few areas of Orsino fine sand that have slopes of 2 to 5 percent and a few areas that have a sand texture.

Many areas are in natural vegetation of sand pine and scattered blackjack, turkey, and post oak, and an understory of palmetto, rosemary, and native grasses.

This soil is very poorly suited to most vegetables, moderately well suited to citrus and deep-rooted improved pasture grasses, and poorly suited to lawn

grasses and most kinds of ornamental plants. Capability unit IVs–2; Sand Scrub range site; woodland group 4.

Palm Beach Series

The Palm Beach series consists of nearly level and gently sloping, excessively drained soils on dunelike ridges, generally parallel to the Atlantic Ocean. These soils formed in thick deposits of marine sand and shell fragments.

In a representative profile the surface layer is dark grayish-brown sand and shell fragments about 3 inches thick. The next layer is brown sand and shell fragments about 12 inches thick. The underlying material, to a depth of 54 inches, is light brownish-gray and light-gray sand and shell fragments. Below this, to a depth of 105 inches, is white to yellowish-brown shells and shell fragments.

Permeability is very rapid throughout. The available water capacity is very low throughout. Organic-matter content and natural fertility are low.

Representative profile of Palm Beach sand within the city limits of Satellite Beach, about 200 feet north of Lum's Restaurant and about halfway between the Atlantic Ocean and State Route A1A:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) sand and shell fragments; single grain; loose; many fine, medium, and large roots; about 30 percent white to yellowish-brown, sand-size shell fragments; moderately alkaline; clear, smooth boundary.

AC—3 to 15 inches, brown (10YR 5/3) sand mixed with white and pale-brown shell fragments; single grain; loose; common fine, medium, and large roots; about 20 percent sand-size shell fragments; moderately alkaline; gradual, wavy boundary.

C1—15 to 24 inches, light brownish-gray (10YR 6/2) sand mixed with white to light yellowish-brown shell fragments; single grain; loose; many medium roots and common fine roots; about 20 percent sand-size shell fragments; moderately alkaline; abrupt, wavy boundary.

C2—24 to 32 inches, light brownish-gray (10YR 6/2) sand mixed with multicolored sand-size shell fragments; single grain; loose; many medium roots; about 40 percent sand-size shell fragments; moderately alkaline; gradual, wavy boundary.

C3—32 to 54 inches, light-gray (10YR 7/2) sand mixed with multicolored shell fragments; single grain; loose; common medium roots; moderately alkaline; abrupt, irregular boundary.

C4—54 to 105 inches, white (10YR 8/1) to yellowish-brown (10YR 5/4) shells and shell fragments mixed with light-gray (10YR 7/2) sand; single grain; loose; about 90 to 95 percent shells and shell fragments; upper 2 to 3 inches is a lens of shells and shell fragments as much as 4 inches in diameter.

Palm Beach soils are mildly alkaline to strongly alkaline throughout.

The A1 horizon is dark brown to dark grayish brown and is 2 to 10 inches thick. The AC horizon is brown to grayish brown and is 10 to 20 inches thick. The horizon is absent in some profiles. The content of shell fragments in the A and AC horizons ranges from 5 to 35 percent.

The C horizon is light brownish gray to light gray. The color depends largely on shell fragments that make up 15 to 90 percent of the volume of the C horizon. Stratified layers of shell and sand are common in this horizon.

Palm Beach soils are associated with Canaveral, Pomello, and Welaka soils and Coastal beaches. They are better drained than all of those soils. They contain shell fragments in all horizons, in contrast with Pomello and Welaka soils, which do not have shells in the A horizon. Compared with Coastal beaches, they are not subject to tidal flooding.

Palm Beach sand (Pb).—This is a nearly level and gently sloping excessively drained soil on dunelike ridges that roughly parallel the Atlantic Ocean. It consists of mixed sand and shell fragments. Slopes are mostly 2 to 5 percent. The water table is at a depth of more than 10 feet.

Included with this soil in mapping are narrow areas that have slopes of 5 to 8 percent and lead to included narrow low sloughs. Also included are areas of soils that contain only a very few shells in the upper 20 to 40 inches and that are brownish yellow to strong brown, a few areas that have a slightly thicker surface layer, and some areas of coarse sand.

Most areas are still in natural vegetation of saw-palmetto, scattered cactus, scrub live oak, sea grapes, and clumps of sea oats.

This soil is not suited to vegetables, citrus, or improved pasture grasses. It is poorly suited to lawn grasses and most kinds of ornamental plants. Some areas are used for recreation. Capability unit VIIs–2; Sand Scrub range site; woodland group 1.

Paola Series

The Paola series consists of nearly level to strongly sloping, excessively drained sandy soils on the tops and sides of ridges. These soils formed in thick beds of eolian sands.

In a representative profile the surface layer is dark-gray fine sand about 5 inches thick. Below this, to a depth of 24 inches, is light-gray fine sand. The subsoil, about 36 inches thick, is also fine sand. The upper 24 inches is strong brown and contains a few tongues of white sand that have dark reddish-brown cemented exteriors. The lower 12 inches is very pale brown and has a few brownish, reddish, and white mottles and streaks. Between depths of 60 and 90 inches is very pale brown fine sand.

Permeability is very rapid, and the available water capacity is very low. Organic-matter content and natural fertility are low.

Representative profile of Paola fine sand, 0 to 5 percent slopes, about 25 feet west of a good motor road and about 0.2 mile south of State Route 46, NE¼SE¼ sec. 13, T. 21 S., R. 34 E.:

A1—0 to 5 inches, dark-gray (10YR 4/1, rubbed), fine sand; single grain; loose; abundant fine and medium roots; low organic-matter content; uncoated sand grains; strongly acid; clear, wavy boundary.

A2—5 to 24 inches, light-gray (10YR 7/1) fine sand; few, fine, distinct, brown (10YR 5/3) stains and black (10YR 2/1) splotches along root channels; single grain; loose; few flakes of charcoal; common fine and medium roots; strongly acid; clear, wavy boundary.

B2—24 to 48 inches, strong-brown (7.5YR 5/8) fine sand; few distinct tongues, 2 inches wide and 18 inches long, that have slightly cemented dark reddish-brown (5YR 3/2) exteriors and white (10YR 8/1) fine sand interiors; few, slightly cemented, reddish-brown (5YR 4/2) nodules; single grain; loose; common fine and medium roots; strongly acid; gradual, wavy boundary.

B3—48 to 60 inches, very pale brown (10YR 7/4) fine sand; few, fine, faint, yellowish-brown (10YR 5/6) and white (10YR 8/2) mottles; dark reddish-brown (5YR 3/4) slightly cemented spots; strong-brown (7.5YR 5/6) exteriors on root channels; single grain;

loose; few fine and medium roots; strongly acid; gradual, wavy boundary.

C—60 to 90 inches, very pale brown (10YR 7/4) fine sand; few, fine, faint, yellowish-brown and white specks; single grain; loose; very few fine roots; strongly acid.

Paola soils are very strongly acid to medium acid throughout and are sand or fine sand in all horizons.

The A1 horizon is 2 to 5 inches thick and is dark grayish brown to light gray. The A2 horizon is light gray to white and is 6 to 40 inches thick. Few to common tongues of the A horizon extend into the B horizon in most profiles. The tongues have black to reddish-brown exteriors and light-gray or white interiors.

The B horizon has redidsh mottles in some profiles. The B2 horizon is strong brown to yellow and is 12 to 60 inches thick. The B3 horizon is lighter colored than the B2 horizon and is typically pale brown or very pale brown. It has yellow, red, and brown mottles.

The C horizon is light yellowish brown or pale brown to white. It is mottled in places with darker or lighter colors.

Paola soils are associated with Astatula, Cocoa, Immokalee, Myakka, Orsino, and St. Lucie soils. They differ from Astatula soils in having a A2 horizon. In contrast with Cocoa soils, they have a light-gray or white A2 horizon and are sand to a depth of 80 inches or more whereas Cocoa soils have a strong-brown A2 horizon and are underlain by coquina rock at a depth of 38 inches. They differ from St. Lucie soils in having a B horizon. They are better drained than Orsino soils. They are much better drained than Immokalee and Myakka soils, and they have a B horizon instead of a Bh horizon.

Paola fine sand, 0 to 5 percent slopes (PfB).—This is an excessively drained soil on ridges. It has the profile described as representative of the series. The water table is below a depth of 10 feet.

Included with this soil in mapping are small areas of Astatula and St. Lucie soils, a few areas where coquina rock is at a depth of 45 inches, and a few steeper areas where the texture is sand.

Many areas are in woods of sand pine and an understory of scattered palmetto, rosemary, and cactus.

This soil is not suited to vegetables and is only moderately well suited to citrus. It is poorly suited to improved pasture grasses, lawn grasses, and most kinds of ornamental plants. Capability unit VIs-1; Sand Scrub range site; woodland group 1.

Paola fine sand, 5 to 12 percent slopes (PfD).—This is an excessively drained sandy soil on the sides of high ridges. The water table is at a depth of more than 10 feet.

Included with this soil in mapping are small areas of St. Lucie soils and small areas that are moderately steep and steep.

Most areas are in natural vegetation of sand pine and an understory of scattered saw-palmetto, rosemary, and cactus.

This soil is not suited to vegetables, citrus, or improved pasture grasses. It is poorly suited to lawn grasses and many kinds of ornamental plants. Capability unit VIIs-1. Sand Scrub range site; woodland group 1.

Paola-Urban land complex (Ph).—This mapping unit is about 55 to 70 percent Paola fine sand, 10 percent Paola fine sand that has been altered by earthmoving machines, and generally 20 to 45 percent Urban land, or areas covered with pavement and buildings. Urban land makes up as much as 60 percent of a few mapped areas and as little as 15 percent of a few. Open areas of Paola fine sand are mostly lawns, vacant lots, and playgrounds. They are so small and so intermixed with Urban land that it is impractical to map the two separately.

Included with this complex in mapping are small areas of Cocoa, St. Lucie, Tavares, and Pomello soils and of Quartzipsamments, smoothed. One or more of those soils make up as much as 25 percent of some areas. Also included are small areas where the soils are sloping to moderately steep.

Areas are nearly level to gently sloping. Many have been modified by grading and shaping, and many have thin layers of dark topsoil spread over the surface. Streets excavated below the original land surface and the excavated material spread over adjacent land areas are common. This excavated material is sometimes used to fill low places in other areas. Reworking of the soil has not been so great in the older communities as in the newer, more densely populated ones.

Paola-Urban land complex is poorly suited to lawn grasses and most ornamental plants. The water table is below a depth of 10 feet. Not assigned to a capability unit, range site, or woodland group.

Parkwood Series, Moderately Fine Subsoil Variant

The Parkwood series, moderately fine subsoil variant, consists of nearly level, poorly drained soils that have a loamy subsoil. These soils are in small hammocks that border streams, poorly defined drainageways, and depressions. They formed in beds of unconsolidated sandy and loamy marine material influenced by underlying calcareous material.

In a representative profile the surface layer is black and is about 7 inches thick. The upper 4 inches is fine sand, and the lower 3 inches is loamy fine sand. The subsoil extends to a depth of 30 inches. It is mainly gray and light-gray sandy clay loam. Common to many hard limestone fragments are in the lower part. Below is gray loamy fine sand to a depth of 43 inches and light brownish-gray fine sand that contains lenses and streaks of gray and dark brown to a depth of 65 inches.

Permeability is very rapid in the surface layer and deep sandy layers and moderate in the loamy layers. The available water capacity is moderate to a depth of about 30 inches and low between 30 and 65 inches. Organic-matter content is moderate in the surface layer. Natural fertility is high.

Representative profile of Parkwood fine sand, moderately fine subsoil variant, in a wooded area about 150 feet south of a good motor road and about 1.3 miles east of U.S. Highway No. 1, NW¼SE¼ sec. 32, T. 20 S., R. 35 E.:

A11—0 to 4 inches, black (N 2/0, rubbed) fine sand; moderate, fine, granular structure; friable; many medium and fine roots; neutral; gradual, smooth boundary.

A12—4 to 7 inches, black (10YR 2/1) loamy fine sand; common, fine, distinct, gray (10YR 5/1) streaks; moderate, medium, granular structure; friable; many medium and fine roots; common medium pores; mildly alkaline; very slightly calcareous; clear, smooth boundary.

B1tg—7 to 10 inches, dark-gray (10YR 4/1) fine sandy loam, weak, medium, subangular blocky structure; friable, slightly sticky; common fine roots and pores; few

marl fragments; moderately alkaline; calcareous; gradual, smooth boundary.

B21tgca—10 to 15 inches, gray (10YR 5/1) sandy clay loam; weak, medium, subangular blocky structure; friable, slightly sticky; common fine roots and pores; sand grains coated and bridged with clay and carbonates; few shell fragments; secondary accumulations of carbonates in few root channels; few calcareous fragments; moderately alkaline; calcareous; clear, smooth boundary.

B22tgca—15 to 22 inches, light-gray (10YR 7/1) sandy clay loam; weak, coarse, subangular blocky structure; friable, sticky; few fine roots; common medium pores; few, coarse, distinct, gray (10YR 5/1), and common, fine, distinct, white (N 8/0), moderately hard limestone fragments; sand grains coated and bridged with clay and carbonates; moderately alkaline; calcareous; gradual, wavy boundary.

B23tgca—22 to 30 inches, light-gray (10YR 7/1) sandy clay loam; massive; friable; few fine roots; about 40 percent white (N 8/0) hard limestone fragments 1/8 to 1/2 inch in size; sand grains coated and bridged with clay and carbonates; moderately alkaline; calcareous; abrupt, wavy boundary.

C1g—30 to 35 inches, gray (10YR 6/1) loamy fine sand; common, medium, prominent, brownish-yellow (10YR 6/6) and light yellowish-brown (2.5Y 6/4) mottles; massive; friable; common fine roots and pores; moderately alkaline; clear, wavy boundary.

C2g—35 to 43 inches, gray (10YR 6/1) fine sand; single grain; loose; moderately alkaline; gradual, wavy boundary.

C3g—43 to 65 inches, light brownish-gray (10YR 6/2) fine sand; few, moderately thick, gray (5YR 6/1) lenses and dark-brown (10YR 3/3) streaks; single grain; loose; mildly alkaline.

Parkwood variant soils are neutral to mildly alkaline in the A1 horizon and mildly alkaline to moderately alkaline in the B and C horizons.

The A1 horizon is black or very dark gray and is 6 to 10 inches thick.

The B1tg horizon is dark-gray to light-gray fine sandy loam or sandy clay loam 2 to 6 inches thick. The B2tgca horizon is dark gray, gray, grayish brown, light brownish gray, light gray, or white and is 15 to 50 inches thick. Few to common hard pieces of gray to white limestone are in the lower part of the B horizon.

The Cg horizon is gray, light brownish-gray, or light-gray loamy fine sand to fine sand. It is mottled in places.

Parkwood variant soils are commonly associated with Bradenton shallow variant, Felda, Immokalee, Myakka, Pompano, and Wabasso soils. Compared with the Bradenton shallow variant, they have a sandy C horizon beneath the subsoil instead of hard limestone. They have a loamy Btca horizon, in contrast wtih the Immokalee, Myakka, and Wabasso soils, all of which have a B2h horizon. They differ from Pompano soils in having a B horizon. Depth to the subsoil is about 10 inches in the Parkwood moderately fine subsoil variant, but is more than 20 inches in Felda soils.

Parkwood fine sand, moderately fine subsoil variant (Pk).—This is a nearly level, poorly drained soil that has a loamy subsoil. It is in hammocks that border streams, poorly defined drainageways, and depressions. Most areas are less than 40 acres in size. The water table is generally at a depth of 10 to 30 inches. During wet periods, it is within a depth of 10 inches for as long as 2 to 4 months. This soil generally is flooded for 7 days to 1 month once in 1 to 5 years.

This soil is not uniform, and any area can contain the entire range of characteristics described for the series. Included with this soil in mapping are small areas of other soils and areas where the subsoil is weakly developed and is underlain by shelly sand.

Most areas have a dense canopy of cabbage palm, live oak, water oak, magnolia, and bay trees and a thick undergrowth of shrubs, vines, and grasses. These areas are difficult to clear, and few have been cleared.

This soil is moderately well suited to citrus if it has been bedded, drained, and provided with good water control. If drainage and water control are adequate, it is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. In its native state this soil provides shelter for cattle and wildlife. Capability unit IIIw-1; Hammock range site; woodland group 12.

Pineda Series

The Pineda series consists of nearly level, poorly drained, sandy soils on broad hammocks and in low sloughs. These soils formed in sandy and loamy marine material.

In a representative profile the surface layer is black sand in the upper 5 inches and dark-gray sand in the lower 8 inches. Below this is 6 inches of light brownish-gray sand. The subsoil extends to a depth of 60 inches. The upper 10 inches is yellowish-brown sand and the next 6 inches is light yellowish-brown sand that has distinct, yellowish mottles. Between depths of 35 and 60 inches, the subsoil is gray sandy loam that has yellowish-brown mottles. Below this is gray loamy sand that contains small lenses and pockets of sandy loam or sandy clay loam.

Permeability is rapid in the sandy layers that extend to a depth of about 38 inches, moderately rapid in the loamy layers that extend from a depth of 38 to 60 inches, and rapid from a depth of 60 to 64 inches. The available water capacity is low in all the sandy layers and moderate in the loamy layers. Organic-matter content is low, and natural fertility is moderate.

Representative profile of Pineda sand in a sparsely wooded area about 0.4 mile northwest of State Route 528, NW1/4SE1/4 sec. 28, T. 24 S., R. 35 E.:

A11—0 to 5 inches, black (10YR 2/1 rubbed) sand; weak, fine, granular structure; friable; many fine and common medium roots; medium acid; clear, wavy boundary.

A12—5 to 13 inches, dark-gray (10YR 4/1) sand; common, fine, faint, very dark gray streaks and light-gray mottles; weak, fine, granular structure; friable; few fine and medium roots; slightly acid; clear, wavy boundary.

A2—13 to 19 inches, light brownish-gray (10YR 6/2) sand; few, coarse, faint, pale-brown (10YR 6/3) mottles; single grain; loose; few fine roots; slightly acid; clear, irregular boundary.

B2ir—19 to 29 inches, yellowish-brown (10YR 5/6) sand; common, coarse, distinct, strong-brown (7.5YR 5/8) mottles and common, fine, distinct, very pale brown streaks along old root channels; single grain; loose; few fine roots; yellowish-brown coatings of iron oxides on sand grains; slightly acid; clear, wavy boundary.

B3ir—29 to 35 inches, light yellowish-brown (10YR 6/4) sand; many, coarse, faint, brownish-yellow (10YR 6/6) mottles; single grain; loose; few fine roots; neutral; abrupt, wavy boundary.

B'1tg—35 to 38 inches, grayish-brown (10YR 5/) loamy sand; common, coarse, faint, brown (10YR 5/3) mottles; weak, coarse, granular structure; friable; few fine roots; neutral; clear, wavy boundary.

B'2tg—38 to 55 inches, gray (10YR 5/1) sandy loam; many, medium and coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few fine roots; common medium

pores; sand grains coated and bridged with clay; few coarse crayfish burrows filled with loamy sand and sandy loam; mildly alkaline; gradual, wavy boundary.

B'3g—55 to 60 inches, gray (10YR 5/1) sandy loam; many, medium and coarse, distinct, yellowish-brown (10YR 5/4) mottles and few, fine, distinct, dark yellowish-brown mottles; massive; friable; few fine roots; few lenses of loamy sand and sandy clay loam; mildly alkaline; gradual, wavy boundary.

Cg—60 to 64 inches, gray (10YR 5/1) loamy sand; common, coarse, faint, dark-gray (10YR 4/1) and few, fine, distinct, dark yellowish-brown mottles; massive; friable; few fine roots; small lenses and pockets of sandy loam or sandy clay loam; mildly alkaline.

Pineda soils are strongly acid to slightly acid in the A horizon, slightly acid to mildly alkaline in the Bir horizon, and neutral to moderately alkaline in the B' and C horizons.

The A11 horizon is black or very dark gray and is less than 6 inches thick. The A12 horizon is dark gray or dark grayish brown and is 4 to 8 inches thick. The A2 horizon is grayish brown to light brownish gray and light gray and is 4 to 6 inches thick. Common mottles of other colors or streaks of the A1 horizon are in the A2 horizon.

The B2ir horizon is strong-brown, yellowish-brown, or yellow sand or fine sand 6 to 16 inches thick. Lighter or darker mottles are in the B2ir horizon in most profiles. The B3ir horizon is light yellowish-brown to very pale brown sand or fine sand 0 to 6 inches thick. The A and Bir horizons combined are 20 to 40 inches thick. The B'tg horizon is light gray to dark gray or light brownish gray to dark grayish brown and contains few to common yellowish or brownish mottles. The B'1tg horizon is loamy sand or sandy loam. The B'2tg horizon is sandy loam or sandy clay loam. Lenses or pockets of loamy sand or sandy loam are in the B'2tg horizon in most profiles. The B'3g horizon is sandy loam or fine sandy loam that contains lenses of loamy sand and sandy clay loam. Many profiles have a black to dark-brown sandy layer 1 to 4 inches thick on top of the B'tg horizon.

The Cg horizon is gray, grayish-brown, or light grayish-brown sand to sandy loam that contains few to many pockets or lenses of loamy sand, sandy loam, or sandy clay loam. The lower part of the Cg horizon in many places contains shell fragments. The fragments are at a depth of 55 inches in some profiles.

Pineda soils are associated with EauGallie, Felda, Floridana, Holopaw, Malabar, Pompano, Valkaria, and Wabasso soils. They have a B2ir horizon, whereas EauGallie and Wabasso soils have a B2h horizon. They differ from Felda, Floridana, Holopaw, and Pompano soils in having a B2ir horizon. They are not so poorly drained as Floridana soils. They are loamy below the B2ir horizon, whereas Valkaria soils are sandy. The depth to the B'2tg horizon is less than 40 inches in Pineda soils, but more than 40 inches in Malabar soils.

Pineda sand (Pn).—This is a nearly level poorly drained sandy soil on broad hammocks and in low sloughs. It has the profile described as representative of the series. The water table is within a depth of 10 inches for 1 to 2 months in most years and between 10 and 40 inches for more than 6 months. In dry periods it is at a depth of more than 40 inches. This soil generally is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are some areas of Malabar, Wabasso, or Felda soils. Also included are a few areas where the surface layer is thicker and darker colored than is typical, and a few areas that are fine sand instead of sand. Also included are a few areas where the loamy layers are calcareous.

A large part of the acreage is in natural vegetation of open forest of scattered pine and cabbage palm and an understory of native grasses. Some areas are covered with thick stands of mixed pine and palm and a few live oak. Sloughs are covered with wetland grasses. Many areas are frequently used for range.

If drainage and water control are adequate, this soil is well suited to citrus, vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IIIw-1; Sweet Flatwoods range site; woodland group 11.

Pineda sand, bedded (Po).—This is a nearly level, poorly drained soil that has been bedded for citrus. The water table has been lowered by drainage and generally is at a depth of about 10 to 40 inches for 2 to 6 months of the year. This soil is similar to Pineda sand, but it has been reshaped and reworked into beds. The bed tops are about 30 feet wide. They are separated by shallow ditches that have sloping sides. The ditches are about 30 feet wide and 28 to 30 inches deep at the deepest point. The surface layer of the beds is the original surface layer that was removed when the ditches were installed.

Included with this soil in mapping are small areas of Felda, Winder, Valkaria, and Floridana soils.

Complex drainage systems have been installed, and almost all areas are in citrus, for which this soil is well suited. Capability unit IIIw-1; not assigned to a range site or woodland group.

Pineda Series, Dark Surface Variant

The Pineda series, dark surface variant, consists of nearly level, poorly drained soils on broad palm hammocks and in low sloughs. These soils formed in sandy and loamy marine sediments.

In a representative profile the surface layer is sand about 20 inches thick. The upper 15 inches is black, and the next 5 inches is very dark grayish brown. Below this is about 4 inches of mottled light brownish-gray and very pale brown sand. The next layer, between depths of 24 and 40 inches, is yellow and brownish-yellow sand. Between depths of 40 and 52 inches is brownish-yellow sandy loam that has gray and white mottles. Below a depth of 52 inches is gray sandy loam that is mottled with yellow and white.

Permeability is rapid in the sandy layers and moderately rapid in the loamy layers and low in the sand layer that extends from a depth of about 20 to 40 inches. Organic-matter content is moderate, and natural fertility is high.

Representative profile of Pineda sand, dark surface variant, in a wooded area about 0.5 mile south of Loughman Lake and 1.75 miles east of Hatbill County Park, NE¼NW¼ sec. 5, T. 22 S., R. 34 E.:

A11—0 to 15 inches, black (10YR 2/1) sand; weak, fine, granular structure; very friable; many fine and medium roots; slightly acid; gradual, wavy boundary.

A12—15 to 20 inches, very dark grayish-brown (10YR 3/3) sand; weak, fine, granular structure; very friable; many fine roots; slightly acid; clear, wavy boundary.

A2—20 to 24 inches, coarsely mottled light brownish-gray (10YR 6/2) and very pale brown (10YR 7/3) sand; single grain; loose; few fine roots; slightly acid; clear, wavy boundary.

B21ir—24 to 33 inches, yellow (10YR 7/6) sand; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; single grain; loose; sand grains well coated

with iron oxide; slightly acid; clear, wavy boundary.

B22ir—33 to 40 inches, brownish-yellow (10YR 6/8) sand; single grain; loose; few, fine, distinct, white (10YR 8/1) and common, medium, faint, very pale brown (10YR 7/4) uncoated sand streaks; brownish-yellow iron oxides coat the sand grains; neutral; abrupt, wavy boundary.

B't—40 to 52 inches, brownish-yellow (10YR 6/6) sandy loam; many, medium, distinct, gray (10YR 5/1) mottles; weak, medium, subangular blocky structure; friable; few, medium, distinct, white (10YR 8/1) sand pockets and few, fine, distinct, very dark gray (10YR 3/1) streaks along root channels; mildly alkaline; sand grains coated and bridged with clay; clear, wavy boundary.

Cg—52 to 60 inches, gray (N 6/0) sandy clay loam; common, prominent, yellow (10YR 7/6) mottles; massive; friable; common, medium, distinct, white (10YR 8/2) carbonitic sand streaks; few, dark grayish-brown (10YR 4/2) decaying roots; mildly alkaline.

Pineda soils, dark surface variant, are medium acid to mildly alkaline in all horizons.

The A1 horizon is black, very dark gray, or very dark grayish brown and is 10 to 22 inches thick. The A2 horizon is grayish brown to light gray, is 4 to 6 inches thick, and is typically mottled. The entire A horizon is less than 30 inches thick.

The B2ir horizon is strong-brown, yellowish-brown, brownish-yellow, or yellow sand or fine sand, is 4 to 18 inches thick, and is typically mottled with lighter or darker colors. Some profiles have a transitional layer, between the B2ir and B't horizons, that is light yellowish-brown to very pale brown sand or fine sand and is as much as 6 inches thick in places. The B't horizon is at a depth of 40 to 60 inches. It varies in color and ranges from light gray, gray, or dark gray to brownish yellow and has few to many mottles of other colors. It is sandy loam or sandy clay loam and contains common streaks of sand or loamy sand.

The Cg horizon is gray, grayish-brown, or light grayish-brown sand to sandy clay loam that contains few to many pockets or lenses of loamy sand or sandy clay loam. Streaks of calcium carbonate have accumulated in the Cg horizon in many places.

Pineda soils, dark surface variant, are associated with EauGallie, Floridana, Malabar, Pompano, Valkaria, and Wabasso soils. They have a thicker, dark-colored A1 horizon than all but Floridana soils. They are not so poorly drained as Floridana soils and have a B2ir horizon that is lacking in those soils. In contrast with EauGallie and Wabasso soils, they have a B2ir horizon instead of a B2h horizon. They have a sandy loam B't horizon at a depth of about 40 inches, whereas Pompano and Valkaria soils are sandy to a depth of 80 inches.

Pineda sand, dark surface variant (Pp).—This is a nearly level, poorly drained sandy soil on broad hammocks and in low sloughs. It has a loamy subsoil at a depth of about 40 inches. The water table is within a depth of 10 inches for 1 to 2 months in most years and is between 10 and 40 inches for more than 6 months. In dry periods it is at a depth of more than 40 inches. This soil is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of Pineda sand. Also included are a few areas where this variant has a browner loamy subsoil and a few areas where the texture is fine sand.

Most areas are still in natural vegetation of thick hammock stands of cabbage palm and pine and a few scattered live oak.

If drainage and water control are adequate, this soil is well suited to citrus, vegetables, improved grasses and clover, lawn grasses, and many kinds of ornamental plants. In its native state it provides limited grazing and shelter for cattle. Capability unit IIIw-1; Hammock range site; woodland group 11.

Pomello Series

The Pomello series consists of nearly level, moderately well drained sandy soils on broad low ridges and low knolls in the flatwoods. These soils formed in thick beds of marine sand.

In a representative profile the surface layer is about 3 inches thick. Below this is light-gray sand to a depth of 50 inches. The next layer is black, weakly cemented sand in the upper 7 inches, dark reddish-brown, weakly cemented sand in the next 5 inches, and dark yellowish-brown sand that contains common, weakly cemented, dark reddish-brown fragments in the lower 8 inches. Brown sand is below a depth of 70 inches.

Permeability is very rapid to a depth of about 50 inches, moderately rapid between 50 and 62 inches, and rapid between 62 and 80 inches. The available water capacity is very low as far down as 50 inches and is moderate below. Organic-matter content and natural fertility are low.

Representative profile of Pomello sand in a wooded area about 0.4 mile east of Satellite Boulevard, NE¼ SE¼ sec. 8, T. 24 S., R. 35 E.:

A1—0 to 3 inches, gray (10YR 5/1) sand; single grain; loose; many fine and few medium and large roots; strongly acid; clear, smooth boundary.

A21—3 to 27 inches, light-gray (10YR 7/1) sand; single grain; loose; many fine and medium and common large roots; strongly acid; gradual, wavy boundary.

A22—27 to 38 inches, light-gray (10YR 7/1) sand; few, coarse, distinct, gray (10YR 5/1) splotches and streaks; single grain; loose; many fine and medium roots; strongly acid; gradual, wavy boundary.

A23—38 to 50 inches, light-gray (10YR 7/1) sand; common, coarse, prominent, very dark brown (10YR 2/2) streaks along old root channels; single grain; loose; many fine and medium roots; strongly acid; abrupt, wavy boundary.

B21h—50 to 57 inches, black (5YR 2/1) sand; weak, coarse, subangular blocky structure; firm, weakly cemented; many fine and medium roots; few pores; few uncoated sand grains; few, fine, distinct, gray to light-gray streaks; strongly acid; gradual, wavy boundary.

B22h—57 to 62 inches, dark reddish-brown (5YR 2/2) sand; weak, medium, subangular blocky structure; firm, weakly cemented; common fine and medium roots; few uncoated sand grains; common, medium, distinct, very dark grayish-brown (10YR 3/2) and dark-brown (10YR 3/3) fragments and few, medium, distinct, very dark brown (10YR 2/2) fragments; strongly acid; clear, wavy boundary.

B3&Bh—62 to 70 inches, dark yellowish-brown (10YR 4/4) sand; single grain; loose, friable; few fine roots; sand grains thinly coated; common, medium and coarse, distinct, dark reddish-brown (5YR 3/3), weakly cemented fragments decreasing in number with depth; strongly acid; clear, wavy boundary.

C1—70 to 80 inches; brown (10YR 5/3) sand; common, medium, pale-brown and dark-brown mottles; single grain; loose; strongly acid.

Pomello soils are strongly acid or very strongly acid throughout the profile.

The A1 horizon is dark gray to light gray and is 1 to 6 inches thick. The A2 horizon is gray to white and contains streaks and splotches of gray, very dark gray, very dark grayish brown, or very dark brown. The entire A horizon ranges from 30 to 60 inches in thickness.

The B2h horizon is black to dark reddish brown, is 2 to 14 inches thick, and has an organic-matter content of about 1 to 6 percent. The B3&Bh horizon is brown to dark yellowish brown, is 4 to 8 inches thick, and contains common black to dark reddish-brown, weakly cemented fragments.

The C horizon is brown, dark grayish brown, to light gray. It extends to a depth of 80 inches or more.

Pomello soils are associated with Immokalee, Myakka, Satellite, and St. Lucie soils. They are better drained than Immokalee, Myakka, and Satellite soils, but are not so well drained as St. Lucie soils. They have a B2h horizon that is lacking in St. Lucie and Satellite soils. The depth to the B2h horizon is 30 to 60 inches in Pomello soils but is 8 to 30 inches in Myakka soils.

Pomello sand (Ps).—This is a nearly level, moderately well drained sandy soil on broad low ridges and low knolls. The water table is 30 to 40 inches below the surface for 2 to 4 months in most years and between 40 and 60 inches for more than 6 months. During dry periods, it is below 60 inches for short periods.

Included with this soil in mapping are a few areas of Myakka and Immokalee soils. Also included are areas of fine sand, small sloping areas, and areas on the Atlantic Coastal Ridge where shell fragments are mixed with the sand beneath the weakly cemented layers. Also included are a few areas where the weakly cemented, dark-colored layer is within a depth of 30 inches.

Most areas are in natural vegetation of a few, scattered, second-growth longleaf pine and an undergrowth of scrubby live oak, saw-palmetto, and native grasses. This soil is not suited to most vegetables and is poorly suited to citrus. It is poorly suited to improved pasture grasses, lawn grasses, and most kinds of ornamental plants. Capability unit VIs–3; Sand Scrub range site; woodland group 3.

Pomello-Urban land complex (Pu).—This complex is about 45 to 60 percent Pomello sand, 20 percent Pomello sand that has been altered for use as building sites, and about 20 to 45 percent Urban land or areas covered by houses, streets, driveways, buildings, parking lots, and other related uses. The open areas of Pomello sand are mostly in lawns, vacant lots, or playgrounds. These areas are usually so small and intermixed that it was impractical to map them separately.

Included with this complex in mapping are small areas of Myakka and Immokalee soils that make up about 15 percent of some areas. Also included are a few small areas that are as much as 60 percent or as little as 15 percent Urban land.

Many areas have been modified by grading and shaping. Reworking of the soil has not been so great in the older communities as in the newer, more densely populated ones. Streets excavated below the original land surface and excavated soil material spread over adjacent land areas are common. Soil material from local drainage ditches or hauled in from elsewhere has been used to fill low places.

Pomello-Urban land complex is poorly suited to lawn grasses and most kinds of ornamental shrubs. In most years the water table is at a depth of 30 to 40 inches for 2 to 4 months and between 40 and 60 inches for more than 6 months. In dry seasons it is below 60 inches for short periods. Not assigned to a capability unit, range site, or woodland group.

Pompano Series

The Pompano series consists of nearly level, poorly drained soils on broad flats, in shallow depressions, and in sloughs. These soils formed in thick beds of marine sand.

In a representative profile the surface layer is sand about 7 inches thick. The upper 2 inches is very dark brown, and the next 5 inches is dark gray. The next layer is light brownish-gray to very pale brown sand about 15 inches thick. Below this is 8 inches of brown sand and 20 inches of grayish-brown sand. Below this, to a depth of 90 inches, is gray sand.

Permeability is very rapid, and the available water capacity is low to very low in all layers. Organic-matter content and natural fertility are low.

Representative profile of Pompano sand south of Rockledge on the Duda Ranch, about 0.25 mile east of farm road, 135 feet south of canal, and 70 feet west of fence, SW¼SE¼ sec. 8, T. 26 S., R. 36 E.:

A11—0 to 2 inches, very dark brown (10YR 2/2); sand; weak, fine, granular structure; many fine roots; very friable; medium organic matter; slightly acid; clear, smooth boundary.

A12—2 to 7 inches, dark-gray (10YR 4/1) sand; few, fine, distinct, grayish-brown (10YR 5/2) vertical streaks; single grain; loose; many fine roots; slightly acid; gradual, wavy boundary.

C1—7 to 12 inches, light brownish-gray (10YR 6/2) sand; many, fine and medium, distinct, dark-gray (10YR 4/1) and very dark gray (10YR 3/1) streaks and lenses; single grain; loose; common fine roots; slightly acid; gradual, wavy boundary.

C2—12 to 22 inches, very pale brown (10YR 7/3) sand; few, fine, faint, pale-brown mottles; single grain; loose; common fine roots; slightly acid; gradual, wavy boundary.

C3—22 to 30 inches, brown (10YR 5/3) sand; few, fine, faint, yellowish-brown mottles; single grain; loose; few fine roots; mildly alkaline; gradual, wavy boundary.

C4—30 to 50 inches, grayish-brown (10YR 5/2) sand; common, medium, distinct, gray (10YR 5/1) and light brownish-gray (10YR 6/2) mottles; single grain; loose; mildly alkaline; gradual, wavy boundary.

C5—50 to 90 inches, gray (10YR 6/1) sand; single grain; loose; mildly alkaline.

Pompano soils are very strongly acid to mildly alkaline in all horizons.

The A horizon is gray to very dark grayish brown and black and is 5 to 12 inches thick. The part of the A horizon that is very dark grayish brown to black is less than 6 inches thick.

The C horizon ranges from brown or olive to light gray or very pale brown and has few to common yellowish or brownish mottles. Streaks of the A horizon are in the upper part of the C horizon. The content of silt and clay in the upper 40 inches is below 10 percent.

Pompano soils are associated with Anclote, Felda, Holopaw, Malabar, Pineda, and Valkaria soils. They are better drained than Anclote soils and do not have the thick black surface layer that is typical of those soils. They are sandy to a depth of 80 inches and lack the loamy layers of Felda, Holopaw, Malabar, and Pineda soils. They lack the Bir horizon of Malabar, Pineda, and Valkaria soils.

Pompano sand (Pw).—This is a nearly level, poorly drained sandy soil on broad flats. in shallow depressions, and in sloughs. In most years the water table is within 10 inches of the surface for 2 to 6 months, and occasionally following heavy rain it rises above the surface for 2 to 7 days. It is ordinarily between depths of

10 and 40 inches for 6 months or more. During dry seasons it drops below 40 inches for brief periods.

Included with this soil in mapping are small areas of Basinger sand and Valkaria sand. Also included are small areas of soils similar to this Pompano soil, but better drained, and a few areas where the texture is fine sand.

The natural vegetation is mostly native grasses and scattered pine and cabbage palm. A few small areas are dense hardwood forest. Large areas are used for pasture.

If drainage and water control are adequate, this soil is suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants and is moderately well suited to vegetables. It is poorly suited to citrus. Capability unit IVw-1; Slough range site; woodland group 6.

Quartzipsamments, Smoothed

Quartzipsamments, smoothed (Qr) are nearly level to steep sandy soils that have been reworked and shaped by earthmoving equipment. They are commonly near urban centers or along major highways on the mainland. Many areas are former sloughs, marshes, or shallow ponds that have been filled with various soil material to surrounding ground level or to elevations above natural ground level. Some areas were originally high ridges that have been excavated to below natural ground level and reworked. In a few places soils have been reworked in place and not moved. Drainage is variable. Most excavated areas are well drained, but the water table is generally within a depth of 50 inches in filled areas.

Permeability is variable but generally is very rapid. Available water capacity is also variable but generally is very low. Natural fertility and organic-matter content are low.

Soil material used to fill low areas has been taken from a wide variety of soils, but mostly from sandy soils, such as St. Lucie, Astatula, Paola, Cocoa, Myakka, Immokalee, and Pomello soils. Any one area can have material from one or several of these soils. Quartzipsamments smoothed do not have an orderly sequence of layers, but are a variable mixture of lenses, streaks, and pockets within short distances. An individual area can be black, grayish, yellowish, brownish, or white, or a mixture of several of these colors. Seldom are two areas alike. Filled areas range from about 1 to 6 feet thick, but in highway overpasses they are many feet thick. Most excavated areas are in high ridges of St. Lucie, Paola, Astatula, or Cocoa soils. Some areas have been excavated as much as 15 to 20 feet below natural ground levels into a white to yellowish sandy substratum. Excavated areas and filled areas commonly occur together, the excavated material used as fill.

Smoothing and shaping has made these areas better suited to use as building sites, roadways, recreational areas, and related uses. These soils are poorly suited to most plants and require special treatment for lawn grasses and ornamental plants. Not assigned to a capability unit, range site, or woodland group.

Satellite Series

The Satellite series consists of nearly level, somewhat poorly drained, sandy soils on broad low ridges in the flatwoods. These soils formed in thick beds of marine sand.

In a representative profile the surface layer is dark-gray sand about 6 inches thick. The next layer is sand that extends to a depth of 80 inches. The upper 39 inches is light gray to light brownish gray, the next 22 inches is grayish brown to dark grayish brown, and the lower part is grayish brown.

Permeability is very rapid throughout the profile. Available water capacity is very low in all layers. Natural fertility and organic-matter content are low.

Representative profile of Satellite sand in a wooded area about 0.15 mile east of the junction of Wickham Road and Post Road and about 200 feet south of Post Road, NW¼NW¼ sec. 6, T. 27 S., R. 37 E.:

A1—0 to 6 inches, dark-gray (10YR 4/1, rubbed) sand; single grain; loose; common fine roots; few medium roots; color caused by mixing of light-gray coarse sand grains and organic matter; very strongly acid; clear, smooth boundary.

C1—6 to 13 inches, light-gray (10YR 6/1) sand; single grain; loose; common fine roots; clean sand grains; very strongly acid; gradual, wavy boundary.

C2—13 to 45 inches, light brownish-gray (10YR 6/2) sand; single grain; loose; few medium and fine roots; many, medium, faint, gray (10YR 5/1) vertical streaks and pockets; clean sand grains mostly quartz; very strongly acid; gradual, wavy boundary.

C3—45 to 53 inches, grayish-brown (10YR 5/2) sand; single grain; loose; clean sand grains; very strongly acid; clear, wavy boundary.

C4—53 to 67 inches, dark grayish-brown (10YR 4/2) sand; common, coarse, distinct, very dark brown (10YR 2/2) and grayish brown (10YR 5/2) mottles; single grain; loose; very dark brown mottles caused by concentration of small pellets of organic matter; very strongly acid; gradual, wavy boundary.

C5—67 to 80 inches, grayish-brown (10YR 5/2) sand; single grain; loose; clean sand grains; very strongly acid.

Satellite soils are very strongly acid to medium acid in all layers.

The A1 horizon is dark gray, gray, dark grayish brown, or grayish brown when rubbed and is 2 to 8 inches thick. In places it is very dark gray and is only 1 to 4 inches thick.

The upper part of the C horizon is white, light gray, or light brownish gray. The color increases with increasing depth to grayish brown or dark grayish brown mottled with very dark brown and grayish brown and in some places with gray.

Satellite soils are associated with EauGallie, Immokalee, Myakka, and Pomello soils. They differ from those soils in not having a B2h horizon. They are better drained than EauGallie, Immokalee, and Myakka soils and are more poorly drained than Pomello soils.

Satellite sand (Sa).—This is a nearly level, somewhat poorly drained sandy soil on broad low ridges in the flatwoods. The water table is 10 to 40 inches below the surface for 2 to 6 months in most years. Most of the time it is within a depth of 60 inches. During prolonged dry periods it is below 60 inches.

Included with this soil in mapping are areas of soils that are darker colored in some layers below the surface layer and areas where the texture is coarse sand instead of sand.

Most areas have a natural vegetation of longleaf or slash pine and scattered scrub live oak and an under-

story of saw-palmetto, runner oak, native grasses, and gallberry. Some areas are used for range.

This soil is not suited to most vegetables and is poorly suited to citrus. It is poorly suited to improved pasture grasses and clover, lawn grasses, and most kinds of ornamental plants. Capability unit VIs-3; Acid Flatwoods range site; woodland group 3.

St. Johns Series

The St. Johns series consists of nearly level, poorly drained sandy soils on broad low ridges, in sloughs, in poorly defined drainageways, and in shallow intermittent ponds in the flatwoods. These soils formed in marine sands.

In a representative profile the surface layer is black sand about 11 inches thick. Below this is gray sand about 8 inches thick. The subsoil extends to a depth of 36 inches. The upper 12 inches is black sand that is weakly cemented with organic matter that coats the sand grains. Next is about 5 inches of dark-brown sand that contains some weakly cemented, dark reddish-brown fragments. Below this, to a depth of 44 inches, is brown sand and, to a depth of 70 inches, pale-brown sand.

Permeability is moderate in the weakly cemented layers and very rapid in all other layers. The available water capacity is moderate in the surface layer and weakly cemented layers and very low to low in all other layers. Organic-matter content is moderate in the surface layer and weakly cemented layers and low in other layers. Natural fertility is low.

Representative profile of St. Johns sand south of Scottsmoor on McCollough Road, 0.3 mile west of U.S. Highway No. 1 and 50 feet north of road, SE¼SE¼ sec. 36, T. 20 S., R. 34 E.:

A1—0 to 11 inches, black (N 2/0, rubbed) sand; weak, medium, granular structure; very friable; many fine and common medium and large roots; color caused by mixing of black organic matter and gray sand grains and gives a dark salt-and-pepper effect when dry; very strongly acid; gradual, wavy boundary.

A2—11 to 19 inches, gray (10YR 5/1) sand; single grain; loose; common, medium and fine roots; common, faint, dark-gray and very dark gray streaks; very strongly acid; abrupt, wavy boundary.

B21h—19 to 22 inches, black (10YR 2/1) sand; moderate, medium, granular structure; firm to friable, weakly cemented; common fine and few medium roots; many uncoated sand grains; very strongly acid; clear, wavy boundary.

B22h—22 to 31 inches, black (5YR 2/1); sand; moderate, medium, granular structure; firm, weakly cemented; few fine roots; very strongly acid; clear, wavy boundary.

B3—31 to 36 inches, dark-brown (7.5YR 3/2) sand; single grain; loose; common, medium, distinct, dark reddish-brown (5YR 2/2), weakly cemented fragments; few fine roots; common, medium, decaying roots; very strongly acid; gradual, wavy boundary.

C1—36 to 44 inches, brown (10YR 5/3) sand; few, medium, faint, dark yellowish-brown mottles; single grain; loose; few medium roots; very strongly acid; gradual, wavy boundary.

C2—44 to 70 inches, pale-brown (10YR 6/3) sand; single grain; loose; very few roots; very strongly acid.

St. Johns soils are strongly acid or very strongly acid in all horizons.

The A1 horizon is black or very dark gray when rubbed. It ranges from 8 to 20 inches in thickness but is mostly 10 to 14 inches thick. The A2 horizon is gray to light gray and is 6 to 20 inches thick. Few to many streaks of the A1 horizon extend into the A2 horizon. The entire A horizon is less than 30 inches thick.

The B21h horizon is black or very dark brown and is 2 to 6 inches thick. The B22h horizon is black to dark reddish brown and is 4 to 20 inches thick. The B3 horizon is brown or dark brown to dark grayish brown and is 4 to 26 inches thick. It contains common, dark reddish-brown, weakly cemented fragments.

The C horizon is brown to pale brown in the upper part and pale brown to white in the lower part. In some profiles is has mottles or streaks of other colors.

St. Johns soils are associated with Immokalee, Myakka, Pomello, and Wabasso soils. They have a thicker black or very dark gray A1 horizon than those soils. They are more poorly drained than Pomello soils. They are sandy below the B2h horizon, and Wabasso soils are loamy. The depth to the B2h horizon is less than 30 inches in St. Johns soils, but is more than 30 inches in Immokalee and Pomello soils.

St. Johns sand (Sb).—This is a nearly level, poorly drained sandy soil on broad low ridges in the flatwoods. This soil has the profile described as representative of the series. The water table is within a depth of 10 inches for 2 to 6 months in most years and typically between 10 and 40 inches the rest of the time. During extended dry periods it is below 40 inches. This soil is occasionally flooded for 2 to 7 days following heavy rains.

Included with this soil in mapping are a few areas of fine sand, small areas where the weakly cemented layer is below a depth of 30 inches, and a few areas where the weakly cemented layer is underlain by loamy material.

Most areas are in natural vegetation of second-growth pond pine and slash pine and a dense understory of saw-palmetto and native grasses. A few areas are used for range.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is moderately well suited to citrus. Capability unit IIIw-1; Acid Flatwoods range site; woodland group 10.

St. Johns soils, ponded (Sc).—These soils are in sloughs, poorly defined drainageways, and shallow intermittent ponds in the flatwoods. Individual areas are generally long and narrow, but some cover 40 acres or more. They consist of St. Johns soils and soils that are similar but have a weakly cemented layer at a depth of 40 to 45 inches. The water table is within a depth of 10 inches for 6 to 12 months in most years. Most areas are continuously flooded for 6 months or more in most years.

Included in mapping are soils that have a dark-colored surface layer more than 20 inches thick and a weakly cemented layer at a depth of 40 to 45 inches. Also included are small areas of Myakka, Micco, and Tomoka soils. The proportion of included soils varies from place to place. Individual soils could not be mapped separately because of prolonged wetness and, in some places, dense vegetation.

These soils are very wet, and drainage is generally not feasible because no suitable outlets are available. Almost all areas are in natural vegetation of marsh grasses, sedges, and St.-Johnswort. Some are wooded with water-tolerant hardwoods and pond pine.

These soils are not suited to cultivated crops, citrus, lawn grasses, or most kinds of ornamental plants. They are poorly suited to improved pasture grasses and clover.

Capability unit Vw–1; Slough range site; woodland group 7.

St. Lucie Series

The St. Lucie series consists of deep, nearly level to strongly sloping, excessively drained sandy soils on high, dunelike ridges and isolated knolls. These soils formed in thick beds of marine or eolian sand.

In a representative profile the surface layer is gray fine sand about 3 inches thick. Below this, to a depth of 120 inches, is white fine sand.

Permeability is very rapid throughout. The available water capacity is very low in all layers. Organic-matter content and natural fertility are low.

Representative profile of St. Lucie fine sand, 0 to 5 percent slopes, in a wooded area about 75 feet east of Clearlake Road, NW¼NW¼ sec. 20, T. 24 S., R. 36 E.:

A—0 to 3 inches, gray (10YR 5/1) fine sand; single grain; loose; common fine and few medium roots; very strongly acid; clear, smooth boundary.

C—3 to 120 inches, white (10YR 8/1) fine sand; single grain; loose; common medium and few fine roots to a depth of 30 inches, few grading to none below; clean sand grains; few, fine, distinct, gray (10YR 5/1) streaks in upper 12 inches; strongly acid.

St. Lucie soils are very strongly acid to slightly acid. The content of silt and clay is less than 5 percent in the upper 40 inches.

The A horizon is gray or light-gray fine sand 1 to 3 inches thick.

The C horizon is light gray to white and extends to a depth of 80 inches or more.

St. Lucie soils are associated with Astatula, Immokalee, Myakka, Paola, Pomello, and Satellite soils. They differ from all those soils in not having a B horizon. They are better drained than all but Paola and Astatula soils.

St. Lucie fine sand, 0 to 5 percent slopes (SfB).—This is an excessively drained sandy soil on high dunelike ridges and isolated knolls. It has the profile described as representative of the series. The water table is below a depth of 10 feet.

Included with this soil in mapping are areas of St. Lucie soils that have a sand rather than a fine sand texture. Also included are small areas of Pomello soils.

Most areas are still in natural vegetation of sand pine and an understory of scattered saw-palmetto, rosemary, and cactus.

This soil is not suited to vegetables, citrus, or improved pasture. It is poorly suited to lawn grasses and most kinds of ornamental shrubs. Capability unit VIIs–1; Sand Scrub range site; woodland group 1.

St. Lucie fine sand, 5 to 12 percent slopes (SfD).—This is an excessively drained sandy soil on the sides of high dunelike ridges. It is similar to St. Lucie fine sand, 0 to 5 percent slopes, but has stronger slopes. The water table is below a depth of 10 feet.

Included with this soil in mapping are some areas where the texture is sand instead of fine sand and a few areas that are steep and very steep.

Most areas are still in natural vegetation of sand pine and an understory of scattered saw-palmetto, rosemary, and cactus.

This soil is not suited to vegetables, citrus, or improved pasture grasses. It is poorly suited to lawn grasses and most kinds of ornamental plants. Capability unit VIIs–1; Sand Scrub range site; woodland group 1.

Spoil Banks

Spoil banks (Sp) are piles of soil material dug from large ditches and canals or dredged from ship channels in the Indian River. On the mainland Spoil banks occur as long, narrow areas adjacent to the ditches and canals from which they were dug. In the Indian River they occur as scattered islands near the ship channel from which they were dredged. One area south of Patrick Air Force Base consists of alternating low ridges of sand and shells dredged from the Indian River and tidal swamp.

The physical properties of Spoil banks vary, depending on the nature of the soils or soil material from which they were taken. The texture in most areas adjacent to ditches and canals is a mixture of sand and loamy sand or sandy clay loam, but some areas are entirely sand. Shells and marl are common, particularly where canals were dug into deep substrata. The islands of dredged material consist mostly of mixed sand and shells. In some places this material contains lumps of clay and in a few places, layers or pockets of peat or muck. Most areas on the mainland are nearly level to steep and do not have a water table within the spoil. Areas on the islands are nearly level or gently sloping and generally have a water table that fluctuates between depths of 30 and 60 inches.

Permeability varies but generally is very rapid. The available water capacity generally is low or very low. Organic-matter content and natural fertility generally are low.

Spoil banks have little use in their natural state. Cabbage palms and pines grow in some areas. Some islands are used for recreation. Some support Australian pine. Many are barren, except for a few weeds. Not assigned to a capability unit, range site, or woodland group.

Swamp

Swamp (Sw) consists of nearly level, poorly drained and very poorly drained areas of soils that have a dense cover of wetland hardwoods, cypress trees, vines, and shrubs. Swamp is in poorly defined natural drainageways, in depressions, and in large bay heads. It is flooded with fresh water most of the time.

The soil pattern in the swamps is intricate and varied. The dense vegetation makes it impractical to map the soils separately. In the northern and central parts of the county and on Merritt Island are the deep sandy Anclote, Pompano, Basinger, Terra Ceia, and Tomoka soils. In the southern part of the county soils are the Floridana, Chobee, Felda, Holopaw, Winder, Montverde, Tomoka, and other soils that have a loamy subsoil.

Swamp is kept in its natural state and used mainly as woodland and wildlife habitat. Though identifiable soils in the mapping unit have higher capability, the dense vegetation makes reclamation impractical in most places. Capability unit VIIw–1; Swamp range site; not assigned to a woodland group.

Tavares Series

The Tavares series consists of nearly level and gently sloping, moderately well drained soils on narrow to

broad, moderately low ridges. These soils formed in thick beds of sandy marine or eolian deposits.

In a representative profile the surface layer is fine sand about 11 inches thick. The upper 6 inches is very dark grayish brown, and the lower 5 inches is dark grayish brown. Below this, to a depth of 80 inches, is sand. The upper 12 inches is brown and yellowish brown, the next 16 inches is light yellowish brown and has mottles of light gray and yellowish brown, and the lower part is pale brown and has mottles of light gray.

Permeability is very rapid throughout. The available water capacity is low and very low in all layers. Natural ertility and organic-matter content are low.

Representative profile of Tavares fine sand in a citrus grove about 2.0 miles south of St. Lukes Episcopal Church and about 200 yards east of the citrus grove headquarters, NW¼SE¼ sec. 3, T. 24 S., R. 36 E.:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary.

A1—6 to 11 inches, dark grayish-brown (10YR 4/2) fine sand; common, medium, distinct, pale-brown (10YR 6/3) mottles; single grain; loose; common fine and many medium and large roots; many fine specks and particles of charcoal; strongly acid; gradual, wavy boundary.

C1—11 to 15 inches, brown (10YR 5/3) fine sand; common, medium, faint, pale-brown (10YR 6/3) streaks along old root channels; single grain; loose; common fine, medium, and large roots; strongly acid; gradual, wavy boundary.

C2—15 to 23 inches, yellowish-brown (10YR 5/4) fine sand; many, very fine, yellowish-brown (10YR 5/8) flecks; single grain; loose; uncoated sand grains; common medium roots; strongly acid; gradual, wavy boundary.

C3—23 to 39 inches, light yellowish-brown (10YR 6/4) fine sand; few, coarse, distinct, light-gray (10YR 7/2) mottles and few, medium, distinct, yellowish-brown (10YR 5/8) streaks along old root channels; single grain; loose; common medium roots; uncoated sand grains; strongly acid; gradual, wavy boundary.

C4—39 to 80 inches, pale-brown (10YR 6/3) fine sand; common, coarse, distinct, light-gray (10YR 7/2) mottles; single grain; loose; uncoated sand grains; strongly acid; gradual, wavy boundary.

Tavares soils are very strongly acid to medium acid throughout the profile.

The A1 horizon is very dark grayish brown to gray and is 4 to 12 inches thick.

The C1 horizon is very pale brown to yellowish brown and 4 to 22 inches thick. The C2 and C3 horizons are yellowish brown or light yellowish brown to very pale brown. The C2 horizon is 4 to 12 inches thick, and the C3 horizon is 16 to 34 inches thick. Few to common mottles of light gray, gray, strong brown, yellowish red, or red are in these horizons. The C4 horizon is brown or pale brown to light gray and has lighter or darker mottles.

Tavares soils are associated with Astatula, Immokalee, Myakka, Paola, Pompano, and St. Lucie soils. They are not so well drained as Astatula, Paola, and St. Lucie soils and are better drained than Immokalee, Myakka, and Pompano soils. They lack the light-gray A2 horizon that is typical of Paola soils. They have a brownish C horizon instead of white or light gray as in St. Lucie soils or grayish as in Pompano soils. They differ from Immokalee and Myakka soils in not having a B2h horizon.

Tavares fine sand (Ta).—This is a nearly level and gently sloping, moderately well drained sandy soil on narrow to broad, moderately low ridges. The water table is at a depth of 40 to 60 inches for more than 6 months in most years. In dry seasons it is below 60 inches.

Included with this soil in mapping are some areas of Tavares soils that have a sand texture and a few places where the water table is below 60 inches most of the time.

Some areas are in natural vegetation of longleaf or slash pine and scattered oak and hickory. The understory is native grasses. Many areas have been cleared and used for citrus.

This soil is well suited to citrus, improved pasture grasses, lawn grasses, and many kinds of ornamental plants. It is poorly suited to most vegetables. Capability unit IIIs-1; Sandhill range site; woodland group 8.

Terra Ceia Series

The Terra Ceia series consists of nearly level, very poorly drained, well-decomposed organic soils in broad flat marshes and small depressions. These soils formed in thick deposits of nonwoody, fibrous, hydrophytic plant remains.

In a representative profile the soil is black muck to a depth of about 54 inches. Below this to a depth of about 70 inches is very dark brown muck. These layers contain small amounts of decomposed plant fibers.

Permeability is rapid and the available water capacity is very high throughout the profile. Organic-matter content is very high, and natural fertility is high.

Representative profile of Terra Ceia muck in a native pasture about 11 miles southwest of Cocoa on the Duda Ranch about 0.15 mile east of the west dike and 300 feet south of the center dike, NW¼NW¼ sec. 34, T. 25 S., R. 35 E.:

Oa1—0 to 9 inches, black (N 2/0, rubbed and unrubbed) muck; moderate, medium, granular structure; friable; many fine and few medium roots; about 10 percent fiber unrubbed; brown (10YR 5/3) sodium pyrophosphate extract; medium acid; gradual, smooth boundary.

Oa2—9 to 19 inches, black (10YR 2/1, unrubbed and 5YR 2/1, rubbed) muck; weak, coarse, subangular blocky fracture faces crush to moderate, medium, granular structure; friable; slightly sticky; about 15 percent fiber unrubbed; few, large, undecomposed plant fragments; few fine roots; brown (10YR 5/3) sodium pyrophosphate extract; medium acid; gradual, smooth boundary.

Oa3—19 to 54 inches, black (N 2/0, unrubbed and 5YR 2/1, rubbed) muck; weak, coarse, subangular blocky fracture faces crush to moderate, medium, granular structure; friable, slightly sticky; less than 5 percent fibers; dark-brown (10YR 3/3) sodium pyrophosphate extract; slightly acid; clear, wavy boundary.

Oa4—54 to 70 inches, very dark brown (10YR 2/2, unrubbed), black (5YR 2/1, rubbed) muck; moderate, medium, granular structure; friable, slightly sticky; very few fibers; pale-brown (10YR 6/3) sodium pyrophosphate extract; mildly alkaline.

Terra Ceia soils are medium acid to moderately alkaline throughout the profile.

The muck Oa horizon is black, dark reddish brown, very dark brown, or dark brown and more than 52 inches thick. Less than one-third is fiber before rubbing. The mineral content ranges from about 5 to 40 percent. The deep substratum layers range from sand to sandy clay loam.

Terra Ceia soils are associated with Anclote, Floridana, Felda, Holopaw, Pompano, Tomoka, Montverde, and Micco soils. They are organic soils, whereas Anclote, Floridana, Felda, Holopaw, and Pompano are minerals soils. They have layers of muck that are 52 inches or more thick, in contrast with Tomoka, soils, which have less than 52 inches of muck

over mineral layers. They are mucks, in contrast with Montverde and Micco soils, which are fibrous peats.

Terra Ceia muck (Tc).—This is a nearly level, very poorly drained muck soil, more than 52 inches thick, in broad flat marsh areas and small depressions. The water table is within a depth of 10 inches for 9 to 12 months in most years, and water stands on the surface for more than 6 months. In dry seasons the water table is lower, but seldom falls below a depth of 30 inches.

Included with this soil in mapping are areas of Tomoka muck, Montverde peat, or Micco peat.

Most areas are in natural vegetation of maidencane, sawgrass, cattails, flags, and scattered to dense thickets of woody button bush. A few areas are wooded with maple, bay, gum, and other wetland hardwoods.

If this soil is reclaimed from its native state by drainage and water control, it is well suited to vegetables. Water-control structures are needed to keep the water level at the proper depth for vegetables and improved pasture grasses and clover, and to reduce the hazard of subsidence by oxidation of the organic matter. This soil is not suited to citrus, but if water is controlled, it is well suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IIIw-4; Fresh Marsh (organic) range site; not assigned to a woodland group.

Tidal Marsh

Tidal marsh (Tm) consists of nearly level areas of soils that are regularly covered with salt water or brackish water at high tide. It occurs along the edge of salt water in several places. Many areas are isolated by deep, wide canals. The soils are highly variable. Some are shallow mucky sands over marl or limestone, some are irregularly stratified mixed sand and shell fragments, some are silty or clayey layers over sand and shells, and some are deep organic material. Any one area of Tidal marsh can be one kind of soil material or a mixture.

Included with this land type in mapping are a few slightly higher areas that are flooded only during storm tides.

Natural vegetation consists of salt-tolerant grasses and weeds. Tidal marsh has little or no value for farming in its native state, because the salt content is high and flooding is frequent. It is not suited to citrus, vegetable crops, improved pasture grasses and clover, lawn grasses, or ornamental plants. It does provide feeding and nesting grounds for wading birds and breeding grounds for other wildlife. Capability unit VIIIw-2; Salt Marsh (mineral) range site; not assigned to a woodland group.

Tidal Swamp

Tidal swamp (Ts) consists of nearly level areas at about mean sea level that are covered with a dense, tangled growth of mangrove trees and roots. It is along the edge of the Banana and Indian Rivers and in smaller areas adjacent to salt water. The dense tangled growth of mangrove trees and roots makes investigation of this unit difficult. The soil material ranges from mixed sand and shells to organic materials.

On more than half the acreage in the county low dikes have been constructed around the seaward perimeter. Artesian wells maintain a fairly constant water level within diked areas for mosquito control and wildlife management. The water is 6 to 36 inches deep within diked areas and is brackish. Very high storm tides can overflow some of the dikes. Areas outside the dikes are generally covered with salt water during daily high tides.

Tidal swamp has little value except as a feeding and nesting ground for wading birds and breeding ground for other wildlife. It is not suited to citrus, vegetable crops, improved pasture grasses and clover, lawn grasses, or ornamental plants. Capability unit VIIIw-2; not assigned to a range site or woodland group.

Tomoka Series

The Tomoka series consists of nearly level, very poorly drained, well-decomposed organic soils in broad flat marshes, small depressions, and swamps. These soils formed in moderately thick beds of hydrophytic, nonwoody plant remains underlain by sandy and loamy mineral layers.

In a representative profile the upper 27 inches is muck that contains small amounts of undecomposed plant fibers. The upper 5 inches is very dark brown, the next 8 inches is dark reddish brown, and the lower 14 inches is black. Below this is 8 inches of very dark gray and gray sand and 11 inches of dark-gray sandy clay loam. Below this, to a depth of 55 inches, is gray sandy loam.

Permeability is rapid in the organic layers and sandy layers and moderate to moderately rapid in the loamy layers. The available water capacity is very high in the organic layers, low in the sandy layers, and moderate in the loamy layers. Organic-matter content is very high, and natural fertility is high.

Representative profile of Tomoka muck in an improved pasture on the Duda Ranch about 1/8 mile south of the north dike and 3/4 mile east of the west dike, NE1/4NW1/4 sec. 26, T. 25 S., R. 35 E.:

Oap—0 to 5 inches, very dark brown (10YR 2/2), very dark brown (10YR 2/2, rubbed and pressed) well-decomposed organic material (muck); about 15 percent fiber, 5 percent rubbed; moderate, medium, granular structure; friable; many fine roots; brown (10YR 5/3) sodium pyrophosphate; extremely acid, pH 4.2 in .01 M calcium chloride; clear, smooth boundary.

Oa2—5 to 13 inches, dark reddish-brown (5YR 2/2), dark reddish brown (5YR 2/2, rubbed and pressed) organic material (muck); about 30 percent fiber, 5 percent rubbed; moderate, medium, granular structure; friable; common fine roots; about 10 percent mineral as light gray (10YR 6/1) sand streaks; brown (10YR 5/3) sodium pyrophosphate; extremely acid, pH 4.2 in .01 M calcium chloride; gradual, smooth boundary.

Oa3—13 to 27 inches, black (10YR 2/1), black (5YR 2/1, rubbed and pressed) well-decomposed organic matter (muck); about 20 percent fiber, 5 percent fiber, rubbed; weak, coarse, subangular blocky fracture faces that break to moderate, medium, granular structure; friable; common fine roots; about 10 percent mineral material; dark-brown (10YR 3/3) sodium pyrophosphate; extremely acid, pH 4.4 in .01 M calcium chloride; abrupt, wavy boundary.

IIC1—27 to 31 inches, very dark gray (10YR 3/1) sand; common, coarse, faint, dark-gray (10YR 4/1) and light-gray (10YR 6/1) streaks; single grain; loose; extremely acid, pH 4.3 in .01 M calcium chloride; clear, wavy boundary.

IIC2—31 to 35 inches, gray (10YR 5/1) sand; single grain; loose; extremely acid, pH 4.3 in .01 calcium chloride; abrupt, wavy boundary.

IIIC3—35 to 46 inches, dark-gray (10YR 4/1) sandy clay loam; few, fine, faint, dark grayish-brown mottles; weak, coarse, subangular blocky structure; friable; few crayfish burrows filled with gray sand; extremely acid, pH 3.4 in .01 M calcium chloride; clear, wavy boundary.

IVC4—46 to 55 inches, gray (10YR 5/1) sandy loam; common, coarse, faint, dark-gray (10YR 4/1) mottles; massive; friable; common sand and sandy clay loam lenses; extremely acid, pH 3.4 in .01 M calcium chloride.

Tomoka soils are extremely acid in the organic layers and strongly acid to extremely acid in the mineral layers.

The muck Oa horizon ranges from 16 to 40 inches in thickness but averages about 27 inches. It is black, dark reddish brown, very dark brown, or dark brown. By volume it is 10 to 33 percent fibrous before rubbing. Sodium pyrophosphate extract is pale brown, brown, or dark brown. Mineral content ranges from about 5 to 40 percent

The IIC horizon is light gray to black and is 6 to 24 inches thick. It is sand and loamy sand and commonly contains pockets of organic material. The IIIC3 horizon is gray to black sandy loam or sandy clay loam 6 to 18 inches thick. The IVC4 horizon is gray to black sandy loam that contains lenses of sand and sandy loam. Mottles of other colors are in the IIIC3 and IVC4 horizons in some profiles. Vertical streaks or lenses of sand or sandy clay loam are common in the IIIC3 and IVC4 horizons. Deep substratum layers are variable and are commonly mixed with shells.

Tomoka soils are associated with Anclote, EauGallie, Felda, Floridana, Holopaw, Myakka, Pompano, and Terra Ceia soils. They are muck soils, whereas all of those soils but Terra Ceia are mineral soils. They differ from Terra Ceia soils in having thinner layers of muck and in having sandy and loamy layers at a depth of less than 52 inches.

Tomoka muck (Tw).—This is a nearly level, very poorly drained muck soil in broad flat marshes, small depressions, and swamps. Sandy and loamy layers are at a depth of 16 to 40 inches. The water table is within a depth of 10 inches for 9 to 12 months in most years, and water is frequently above the surface. In dry periods it is between 10 and 30 inches.

Included with this soil in mapping are areas of Terra-Ceia muck, small areas of Floridana soils, and areas where the organic material is less than 16 inches thick.

Most areas are in natural vegetation of maidencane, sawgrass, cattails, flags, and scattered to dense thickets of woody button bush. A few areas are wooded with swamp hardwoods consisting of maple, gum, bay, and other wetland hardwoods. Some areas are used for range and improved pasture (fig. 6).

If reclaimed from its native state by drainage and water control, this soil is suited to vegetables. Water control structures are needed to keep the water level at the proper depth for vegetables and improved pasture grasses and clover, and to reduce the hazard of subsidence by

Figure 6.—Improved pasture on poorly drained Tomoka muck.

oxidation of the organic matter. The soil is not suited to citrus, but if water is controlled properly, it is well suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. Capability unit IIIw-4; Fresh Marsh (organic) range site; not assigned to a woodland group.

Urban Land

Urban land (Ur) consists of areas that are 60 to more than 75 percent covered with streets, buildings, large parking lots, shopping centers, industrial parks, airports, and related facilities. Unoccupied areas, mostly lawns, parks, vacant lots, and playgrounds, are Astatula, Paola, Myakka, St. Lucie, Immokalee, Pomello, Cocoa, and Canaveral soils in tracts too small to be mapped separately. Not assigned to a capability unit, range site, or woodland group.

Valkaria Series

The Valkaria series consists of nearly level, poorly drained sandy soils in low palm hammocks, grassy sloughs, and broad low areas. These soils formed in sandy marine sediments.

In a representative profile the surface layer is sand about 9 inches thick. The upper 5 inches is black, and the next 4 inches is dark grayish brown. Below this is 6 inches of light-gray sand. The subsoil is sand and extends to a depth of 41 inches. The upper 4 inches is light yellowish brown mottled with gray and yellow, the next 14 inches is mainly brownish yellow mottled with brown and gray, and the lower 9 inches is brown. Below this, to a depth of 80 inches, is gray sand mottled with dark gray.

Permeability is very rapid, and the available water capacity is very low to low in all layers. The organic-matter content and natural fertility are low.

Representative profile of Valkaria sand in a native pasture about 100 feet north of Rector Road, SW¼ NW¼ sec. 14, T. 24 S., R. 35 E.:

A11—0 to 5 inches, black (10YR 2/1) sand; weak, fine, granular structure; friable; common fine and few medium and large roots; slightly acid; clear, smooth boundary.

A12—5 to 9 inches, dark grayish-brown (10YR 4/2) sand; few, fine, distinct, black (10YR 2/1) and few, faint, light brownish-gray (10YR 6/2) mottles; single grain; loose; common fine roots; slightly acid; gradual, wavy boundary.

A2—9 to 15 inches, light-gray (10YR 7/2) sand; common, medium, distinct, grayish-brown (10YR 5/2) mottles and streaks; single grain; loose; few fine and medium roots; slightly acid; gradual, wavy boundary.

B1ir—15 to 19 inches, light yellowish-brown (10YR 6/4) sand; common, medium and coarse, distinct, light-gray (10YR 7/2) and few, medium, faint, brownish-yellow (10YR 6/6) mottles; single grain; loose; sand grains coated with iron oxides; light-gray clean sand grains; slightly acid; clear, wavy boundary.

B2ir—19 to 28 inches, brownish-yellow (10YR 6/6) sand; few, coarse, faint, yellowish-brown (10YR 5/8) and few, medium and coarse, distinct, light-gray (10YR 7/2) mottles; single grain; loose; light-gray clean sand grains; sand grains coated with iron oxides; slightly acid; clear, wavy boundary.

B31ir—28 to 32 inches, pale-brown (10YR 6/3) sand; few, medium, faint, yellowish-brown (10YR 5/4) and common, medium, distinct, light-gray (10YR 7/2) mottles; single grain; loose; sand grains thinly coated with iron oxides; light-gray clean sand grains; slightly acid; clear, wavy boundary.

B32ir—32 to 41 inches, brown (10YR 5/3) sand; single grain; loose; sand grains thinly coated with iron oxides; slightly acid; clear, wavy boundary.

C—41 to 80 inches, gray (10YR 6/1) sand; few, coarse, faint, dark-gray (N 4/0) mottles; single grain; loose; clean sand grains; neutral.

Valkaria soils are sand or fine sand in all horizons.

The A1 horizon is dark gray to black and is 4 to 10 inches thick. In areas where it is very dark gray or black, it is less than 8 inches thick. The A2 horizon is gray, grayish brown, or light gray and is 6 to 28 inches thick. It has few to common black or brownish mottles. The A horizon is strongly acid to neutral.

The B1ir horizon is light yellowish brown, brown, very pale brown, or pale brown and is 0 to 4 inches thick. The B2ir horizon is strong brown to light yellowish brown and brownish yellow to yellow or reddish yellow and is 8 to 20 inches thick. The B3ir horizon is brown, pale brown, very pale brown, or light yellowish brown and is mottled with lighter or darker colors. The B31ir horizon is 4 to 10 inches thick, and the B32ir horizon is 0 to 12 inches thick.

The C horizon is dark gray to light gray or light brownish gray and extends to a depth of 80 inches or more. The Bir and C horizons are strongly acid to moderately alkaline.

Valkaria soils are associated with Anclote, Felda, Immokalee, Malabar, Myakka, Pineda, and Pompano soils. They are better drained than Anclote soils and lack the thick, black A1 horizon typical of those soils. They have a Bir horizon instead of the grayish C horizon of Anclote and Pompano soils. In contrast with Felda, Malabar, and Pineda soils, they are sandy to a depth of 80 inches or more and do not have a B2tg horizon. They differ from Immokalee and Myakka soils in having a Bir horizon instead of a B2h horizon.

Valkaria sand (Va).—This is a nearly level, poorly drained sandy soil in grassy sloughs, low palm hammocks, and broad low areas. It is frequently flooded for periods of 2 to 7 days following heavy rains. The water table is within a depth of 10 inches for 2 to 6 months of most years. In dry periods it is within a depth of 30 inches most of the time.

Included with this soil in mapping are some areas of Valkaria fine sand and a few areas where the yellowish subsoil is calcareous. Also included are a few areas that have a black surface layer 10 inches thick and small areas of Malabar and Pineda soils.

Most areas are still in natural vegetation, and some are in improved pasture. In sloughs this soil is covered with marsh grasses. Hammocks are wooded with cabbage palm and scattered live oak and pine. Broad low areas have natural vegetation of palmettos, St.-Johnswort, wax myrtle, and native grasses and widely spaced pine and cypress trees.

If drainage and water control are adequate, this soil is moderately well suited to vegetables and well suited to improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. This soil is suited to citrus. Capability unit IVw-1; Slough range site; woodland group 6.

Wabasso Series

The Wabasso series consists of nearly level, poorly drained soils on broad areas in the flatwoods and on low ridges on the flood plains. These soils formed in sandy marine sediments over loamy materials.

In a representative profile the surface layer is about 5 inches thick. The upper 3 inches is black, and the next 2 inches is very dark gray. Below this is 18 inches of gray and light-gray sand. The next layer, between depths of 23 and 34 inches, is black sand. The upper 5 inches is friable and has many uncoated sand grains, and the lower part is weakly cemented. The next 16 inches, between depths of 34 and 50 inches, is light brownish-gray sandy clay loam that is mottled with gray, yellow, and red. Below this, to a depth of 62 inches, is light olive-gray sandy loam that has reddish and brownish mottles.

Permeability is rapid to a depth of about 28 inches and moderate between 28 and 62 inches. The available water capacity is low to very low to a depth of about 23 inches and moderate from a depth of about 23 to 62 inches. Organic-matter content and natural fertility are low.

Representative profile of Wabasso sand in a wooded area about 6.5 miles west northwest of Titusville and about 1,000 feet south of a poor motor road, NW¼SE¼ sec. 34, T. 21 S., R. 34 E.:

A11—0 to 3 inches, black (10YR 2/1, rubbed) sand; single grain; loose; many fine and medium roots; very strongly acid; gradual, smooth boundary.

A12—3 to 5 inches, very dark gray (10YR 3/1) sand; single grain; loose; common fine and few medium roots; very strongly acid; clear, smooth boundary.

A21—5 to 12 inches, gray (10YR 5/1) sand; few, medium, distinct, very dark gray (10YR 3/1) streaks; single grain; loose; few fine and medium roots; very strongly acid; gradual, wavy boundary.

A22—12 to 23 inches, light-gray (10YR 6/1) sand; few, medium, distinct, very dark gray (10YR 3/1) streaks; single grain; loose; few fine roots; very strongly acid; clear, wavy boundary.

Bh&A2—23 to 28 inches, black (10YR 2/1) sand; moderate, medium, granular structure; very friable; common medium roots; many uncoated sand grains; very strongly acid; gradual, wavy boundary.

B2h—28 to 34 inches, black (5YR 2/1) sand; moderate, medium, granular structure; firm, weakly cemented; sand grains coated with organic matter; very strongly acid; abrupt, wavy boundary.

B'2t—34 to 50 inches, light brownish-gray (10YR 6/2) sandy clay loam; common, medium, distinct, gray (10YR 5/1) and yellowish-brown (10YR 5/8) mottles and few, fine, prominent, yellowish-red (5YR 5/8) streaks; weak, medium, subangular blocky structure; friable, slightly sticky; sand grains coated and bridged with clay; few lenses and pockets of sand and loamy sand; slightly acid; gradual, wavy boundary.

Cg—50 to 62 inches, light olive-gray (5YR 6/2) sandy loam; common, medium, prominent, red (2.5YR 4/8) and strong-brown (7.5YR 5/8) and common, medium, distinct, dark-brown (7.5YR 4/2) streaks and mottles; massive; friable; common lenses and pockets of sand and loamy sand; neutral.

Wabasso soils are strongly acid or very strongly acid in the A and Bh horizons and medium acid to mildly alkaline in the B'2t and C horizons.

The A1 horizon is dark gray to black and is 4 to 8 inches thick. The A2 horizon is gray to light gray and is 8 to 22 inches thick. Streaks of the A1 horizon extend into the A2 horizon. The entire A horizon is less than 30 inches thick.

The Bh&A2 horizon is black or very dark brown sand or fine sand 2 to 8 inches thick. The B2h horizon is black to dark reddish-brown sand or fine sand 4 to 10 inches thick. The B'2t horizon is within a depth of 40 inches and is dark brown to light brownish gray or light gray mottled with red, yellow, or brown. It ranges from sandy loam to sandy clay loam. Few to common lenses of sand to loamy sand are in this horizon.

The Cg horizon is light gray to light olive gray and ranges from sand to sandy loam. It contains few to many lenses and pockets of coarser or finer material.

Wabasso soils are associated with EauGallie, Floridana, Holopaw, Myakka, Immokalee, Malabar, Pineda, and Pompano soils. They have a loamy B'2t horizon that is lacking in Immokalee and Myakka soils. They are better drained than Floridana soils. They have a B2h horizon that is lacking in Holopaw and Pompano soils. They lack the Bir horizon that is typical of Malabar and Pineda soils. Depth to the B'2t horizon is less than 40 inches in Wabasso soils and more than 40 inches in EauGallie soils.

Wabasso sand (Wa).—This is a nearly level, poorly drained, sandy soil on broad areas in the flatwoods and on low ridges on the flood plains. The water table is within a depth of 10 inches for 1 or 2 months in most years and is within 30 inches most of the time. In dry seasons it falls below 30 inches for short periods. The soil is flooded for 2 to 7 days once in 1 to 5 years.

Included with this soil in mapping are small areas of EauGallie, Myakka, and Pineda soils. Also included are a few areas where the weakly cemented layer is at a depth of more than 30 inches, and a few other areas where the weakly cemented layer is poorly expressed. Also included are areas where the texture is fine sand and a few areas where the loamy layers are underlain by limestone.

In the flatwoods natural vegetation is mainly open forest of second-growth longleaf or slash pine and an understory of saw-palmetto, runner oak, and native grass and a few gallberry and scattered palms. Areas on low ridges on the flood plain are generally covered with dense stands of pine and cabbage palm and scattered live oak. Many areas of Wabasso sand are still in natural vegetation and are commonly used for range. The dense pine and palm provide good shelter for cattle.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, and many kinds of ornamental plants. It is moderately well suited to citrus. Capability unit IIIw-1; Acid Flatwoods range site; woodland group 10.

Welaka Series

The Welaka series consists of nearly level, well-drained sandy soils on moderately broad ridges interspersed with long narrow sloughs. These soils formed in sandy marine or eolian deposits.

In a representative profile the surface layer is very dark gray sand about 3 inches thick. Below this is 15 inches of light-gray sand. The subsoil is sand and extends to a depth of 55 inches. The upper 10 inches is brownish yellow, the next 15 inches is yellowish brown mottled with yellowish red and red, and the lower 12 inches is brownish yellow that has a few red and strong-brown mottles. Below this is 4 inches of white mixed sand and shell fragments that are weakly cemented. Below this, to a depth of 80 inches, is pale-brown mixed sand and shells.

Permeability is very rapid in all layers. The available water capacity is very low in all layers. Organic-matter content and natural fertility are low .

Representative profile of Welaka sand about 1.5 miles south of junction of State Route 3 and South Patrick

Drive on EauGallie Beach, about 100 feet east of street, SE¼SW¼ sec. 24, T. 27 S., R. 37 E.:

A1—0 to 3 inches, very dark gray (10YR 3/1, rubbed) sand; single grain; loose; many medium and large roots; very strongly acid; clear, wavy boundary.

A2—3 to 18 inches, light-gray (10YR 7/1) sand; single grain; loose; many medium and large roots; uncoated sand grains; very strongly acid; clear, irregular boundary.

B21ir—18 to 28 inches, brownish-yellow (10YR 6/6) sand; common, coarse, faint, very pale brown (10YR 7/3) mottles; single grain; loose; many medium and large roots; sand grains coated with iron oxide; very strongly acid; clear, irregular boundary.

B22ir—28 to 43 inches, yellowish-brown (10YR 5/8) sand; few, fine, faint, very pale brown streaks, few, medium and coarse, distinct, yellowish-red and few, fine, prominent, red mottles; single grain; loose; few fine and large roots; reddish mottles in clusters and more numerous in lower 12 inches; many, fine, faint, pale-brown mottles; sand grains coated with iron oxides; mottles firm after exposure to air; common, medium coarse, weakly cemented, yellowish-brown (10YR 5/8) balls; medium acid; gradual, wavy boundary.

B23ir—43 to 55 inches, brownish-yellow (10YR 6/8) sand; few, fine, distinct, red, few, medium, distinct, strong-brown (7.5YR 5/8), and common, medium and coarse, very pale brown (10YR 8/3) mottles; single grain; loose; few fine roots; sand grains coated with iron oxides, slightly acid; abrupt, wavy boundary.

IIC1—55 to 59 inches, white (10YR 8/2) mixed sand and shell fragments; massive; weakly cemented with carbonates; few medium roots; few coarse, prominent, yellow sand streaks; many fine and medium roots; about 40 percent shell and strongly cemented fragments larger than 2 millimeters; moderately alkaline; calcareous; clear, broken boundary.

IIC2—59 to 80 inches, pale-brown (10YR 6/3) mixed sand and shell fragments; single grain; loose; color caused by mixing of white sand grains and multicolored shell fragments; few, medium, distinct yellowish-brown (10YR 5/6) sand streaks; about 45 percent shell fragments, about 15 percent larger than 2 millimeters; moderately alkaline; calcareous.

Welaka soils are extremely acid to slightly acid in the the A and Bir horizons and moderately alkaline in the IIC horizons.

The A1 horizon is black to dark gray rubbed and is 2 to 4 inches thick. The A2 horizon is light gray or white and is 10 to 24 inches thick.

The Bir horizon is yellowish-brown, brownish-yellow, yellow, strong-brown, or reddish-yellow sand, fine sand, or coarse sand 24 to 42 inches thick. It contains few to common, medium to coarse mottles in shades of brown and yellow. Mottles of yellowish red to dark red that are segregated iron range from few to common and become firm on exposure to air. Total thickness of the A and Bir horizons ranges from 40 to 60 inches.

The IIC horizon is pale-brown, light-gray, or white sand, coarse sand, or fine sand that is 25 to 65 percent shell fragments. In some places part of the shell is cemented into fragments larger than 2 millimeters.

Welaka soils are associated with Canaveral, Myakka, Palm Beach, and Pomello soils. They are better drained than all but Palm Beach soils. They have a Bir horizon below the surface layer that is lacking in Palm Beach, Canaveral, Myakka, and Pomello soils. They lack the Bh horizon that is typical of Myakka and Pomello soils.

Welaka sand (We).—This is a nearly level, well-drained sandy soil on moderately broad ridges interspersed with long narrow sloughs. The water table is at a depth of 40 to 60 inches for brief periods during the rainy season, but is usually below 60 inches.

Included with this soil in mapping are some areas that are gently sloping and small areas of wetter soils. Also included are some areas of coarse sand.

Almost all areas are covered with natural vegetation of sand pine and an undergrowth of saw-palmetto and rosemary.

This soil is not suited to vegetables and is poorly suited to citrus, improved pasture grasses, lawn grasses, and most kinds of ornamental plants. Capability unit VIs–2; Sand Scrub range site; woodland group 4.

Winder Series

The Winder series consists of nearly level, poorly drained sandy soils in low areas and on low ridges. These soils formed in loamy marine material.

In a representative profile the surface layer is very dark gray loamy sand about 5 inches thick. Below this is 7 inches of dark-gray loamy sand. The subsoil extends to a depth of 31 inches. The upper 5 inches is sandy loam that has common brownish mottles and a few sand streaks, and the lower 14 inches is gray sandy clay loam that has a few brownish mottles and streaks of sand and loamy sand. The next 16 inches is mottled yellowish, brownish, and grayish sandy clay loam that is about 30 percent white shell fragments. Below this, to a depth of about 65 inches, is gray sandy clay loam that is about 15 percent shells.

Permeability is rapid in the sandy layers and moderate in the loamy layers. The available water capacity is low in the sandy layers and moderate in the loamy layers. Organic-matter content is low, and natural fertility is moderate.

Representative profile of Winder loamy sand in a pasture on the Deseret Farms, about 2 miles south of an unimproved farm road and 25 feet east of a lateral ditch, SE¼SW¼ sec. 22, T. 27 S., R. 35 E.:

Ap—0 to 5 inches, very dark gray (10YR 3/1, rubbed) loamy sand; moderate, medium, granular structure; friable; many fine roots; few, medium, faint, dark-brown (10YR 3/3) sand streaks; neutral; clear, smooth boundary.

A2—5 to 12 inches, dark-gray (10YR 4/1) loamy sand; few, medium, distinct, black (N 2/0) sandy loam streaks and pockets and few, medium, faint, light brownish-gray (10YR 6/2) streaks; moderate, medium, granular structure; friable; common fine roots; mildly alkaline; gradual, irregular boundary.

B1tg&A—12 to 17 inches, gray (10YR 5/1) sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) streaks along root channels; common, coarse, distinct, dark-gray (10YR 4/1) and few, medium, faint, light brownish-gray (10YR 6//2) sand streaks; weak, coarse, subangular blocky structure; friable; common fine roots; few medium pores; clay coatings on sand grains; mildly alkaline; gradual, irregular boundary.

B2tg&A—17 to 31 inches, gray (5Y 5/1) sandy clay loam; few, coarse, prominent, calcareous, yellowish-brown (10YR 5/8) mottles; common, medium, distinct, brown (10YR 5/3) mottles; few, coarse, distinct, dark-gray (10YR 4/1), vertical sandy loam tongues and few, coarse, distinct, light brownish-gray (10YR 6/2), vertical sand streaks; weak, coarse, subangular blocky structure; friable, sticky; common fine roots; common fine pores; sand grains are coated and bridged with clay; mildly alkaline; clear, wavy boundary.

IIC1g—31 to 47 inches, mottled brownish-yellow (10YR 6/6), pale-brown (10YR 6/3), and light-gray (10YR 7/2) sandy clay loam; massive; friable; few fine roots; about 30 percent white and very pale brown, soft and hard shell or marl fragments as much as 1 inch in

diameter; moderately alkaline; calcareous; clear, wavy boundary.

IIC2g—47 to 65 inches, gray (10YR 6/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; about 15 percent white and light-gray shell fragments as much as ½ inch in diameter; few lenses and streaks of sandy loam and loamy sand; moderately alkaline; calcareous.

Winder soils are medium acid to mildly alkaline in the A horizon, slightly acid to moderately alkaline in the Btg&A horizon, and moderately alkaline in the IICg horizon.

The Ap or A1 horizon is black or very dark gray and is 3 to 8 inches thick. The A2 horizon is dark gray to light gray and is 4 to 12 inches thick. It contains streaks of material from the Ap horizon or A1 horizon or other mottles. The entire A horizon is less than 20 inches thick.

The B1tg&A horizon is dark gray to light gray and is 3 to 6 inches thick. The B2tg&A horizon is dark grayish brown, olive gray, gray, or light gray. It is sandy clay loam, but contains few to common tongues from the A horizon. It is 12 to 28 inches thick.

The IIC1g horizon is coarsely mottled white, pale brown, brownish yellow, and yellowish brown, or gray. It is sandy clay loam or sandy loam and is 6 to 20 inches thick. In some profiles this horizon has a few tongues of coarser material. The shell content in the IIC1g horizon varies. The IIC2g horizon is loamy sand to sandy clay loam, contains few to common lenses and pockets of coarser or finer textured material, and is mixed with shells. It is white to gray and has brownish or yellowish mottles.

Winder soils are associated with Chobee, EauGallie, Felda, Malabar, Pineda, and Wabasso soils. They are better drained than Chobee soils and lack the thick black A1 horizon of those soils. They lack the B2h horizon that is typical of EauGallie and Wabasso soils and the B2ir horizon typical of Malabar and Pineda soils. The loamy subsoil is within a depth of 20 inches in Winder soils and between depths of 20 and 40 inches in Felda soils.

Winder loamy sand (Wn).—This is a nearly level, poorly drained soil in broad low areas and on low ridges. The water table is within 30 inches of the surface most of the time and is within 10 inches for 2 to 6 months in most years. During short, dry periods it is below 30 inches. This soil is occasionally flooded for 2 to 7 days following heavy rains.

Included with this soil in mapping are small areas of Chobee and Felda soils. Also included are a few areas where the surface layer is sand or fine sand and a few places where the subsoil is sandy loam.

A large part of the acreage is in broad, low areas where the natural vegetation is sand cordgrass, maidencane, and saw-palmetto. On low ridges the vegetation is pine, live oak, and native grasses. A large acreage is used for range.

If drainage and water control are adequate, this soil is well suited to vegetables, improved pasture grasses and clover, lawn grasses, many kinds of ornamental plants, and, in most areas, to citrus. Capability unit IIIw-1; Fresh Marsh (mineral) range site; woodland group 13.

Use and Management of the Soils

The soils in Brevard County are used extensively for pasture, range, woodland, citrus, and to a lesser, but important extent, for vegetable crops. They are also used for homesites and urban facilities and for wildlife. This section discusses the management of the soils for these uses, explains the capability classification system, defines the capability units, and shows estimated yields of the main crops. It also explains how the soils can be managed for range, woodland, and wildlife and for building highways, farm ponds, irrigation systems, and other engineering structures.

Cultivated Crops, Citrus Crops, and Pasture

Most of the soils of Brevard County have serious limitations or hazards that must be overcome before cultivated crops, citrus, and improved pasture can be grown successfully. Under good management, these limitations or hazards are considered and adequate measures are provided to correct or eliminate them.

A continuous or seasonal high water table affects most of the soils. During rainy periods, the excess water in the root zone is harmful to crops. In dry seasons, crops grown in some areas are damaged by a shortage of water. A combined system of drainage and irrigation provides a high degree of water control by removing excess water in wet periods and by supplying water in dry periods. A subsurface irrigation system similar to the one described in the section "Engineering Interpretations" is commonly used to accomplish good water control. Soils along the St. Johns River must also be protected from flooding or overflow if they are used for cultivated crops, citrus, or improved pasture.

The soils are predominantly nearly level and rapidly permeable. Erosion, therefore, is not a serious hazard. It can occur, however, along ditchbanks and dikes, so these areas need the protection of a vegetative cover. Soil blowing is a hazard on some of the better drained soils. Cultivated soils should be protected by cover crops that require minimum tillage. The root zone in most soils is sandy and has a low or very low available water capacity and low capacity to hold plant nutrients. These properties can be improved if cover and green manure crops, such as hairy indigo, are grown between crops or in the citrus groves. Incorporating plant residue into the soil in cultivated fields is also beneficial. Plant nutrients are rapidly leached from most soils, and natural fertility generally is low. The response to fertilizer varies, depending on the kind of soil and type of management. Most soils used for crops need heavy applications of fertilizer. Despite the poor soil properties, intensive management is generally practical, because the climate is favorable.

About 70,000 acres of the county is improved pasture. About 80 percent of this acreage is in the St. Johns River Basin. Soils in the acid flatwoods are used to a lesser extent for improved pasture. Pastures require proper fertilization and liming, good management, and a water control system to remove excess surface water. Soils adjacent to the St. Johns River must also be protected from overflow if they are used for improved pasture. Subsurface irrigation is used on many areas of improved pasture to provide adequate moisture for grasses and clover during dry periods. Pangolagrass, bahiagrass, and improved bermudagrasses are the most widely used pasture grasses. St. Augustinegrass and ryegrass are used for pasture on the organic soils to a very limited extent. White clover, Hubam clover, and clover-grass mixtures are used for grazing in winter where irrigation is available.

Most areas of improved pasture are used for beef cattle in cow-calf type operations. The two dairies in the county also use improved pastures.

In the past few years, the number of light horses in the county for horseback riding and other equestrian activities has increased. Improved pastures provide good quality feed and exercise for horses.

A good pasture not only supplies forage for livestock, but also protects the soils from soil blowing and water erosion. It improves the quality of the soil by adding organic matter, making a better environment for microorganisms, and improving tilth.

Citrus is grown on both acid and alkaline soils (fig. 7). Some of the soils extensively used for citrus are Astatula fine sand, dark surface layer, Felda sand, bedded, and Pineda sand, bedded. The largest citrus-producing areas of the county are the Mims area, the central and northern parts of Merritt Island, and an area just west of Micco. Citrus groves occur to some extent throughout the county except for the St. Johns River flood plain and north of Floridana on the Atlantic beaches. Most of the citrus is marketed as fresh fruit under the name Indian River Fruit and is sold at premium prices. Citrus culture on these soils requires intensive water control that includes deep drainage, bedding, diking, and subsurface or sprinkler irrigation. Other high-level management practices, such as fertilization and pest control, are also needed. A small acreage of citrus is planted on well-drained soils that do not need drainage but do need irrigation for good production. A cover crop and minimum tillage are needed in all groves to prevent erosion.

Subtropical fruits, such as avocado and mango, are grown commercially to a limited extent on the south end of Merritt Island. Potential damage from cold weather limits production. These subtropical fruits are planted on well-drained soils. Cover crops and minimum tillage are needed to prevent erosion.

Tomatoes are the main vegetable crop grown on a commercial basis, but on a very small scale. Most of the tomatoes are grown on mineral soils, such as Anclote sand, Floridana sand, and St. Johns sand. Cabbage and sweet corn are grown on these mineral soils and also on organic soils, such as Micco peat and Montverde peat. Watermelons are most commonly grown on sandy mineral soils, such as EauGallie sand and Pomello sand. Potential for vegetable production in the county is good.

For vegetables grown on poorly drained and very poorly drained soils, a complete water control system that maintains uniform moisture conditions is needed. Such systems require carefully designed ditching, diking, and

***Figure 7.*—A 7-year-old orange grove on Tavares fine sand. The ground cover of grasses has been mowed and disked into the soil in preparation for harvesting.**

pumping. They remove excess water in wet seasons and supply water through subsurface irrigation in dry seasons. Heavy applications of lime and fertilizer are needed. On many of the soils cover and green-manure crops should be grown to prevent erosion and improve tilth. Strips of tall-growing crops, such as sorghum, protect the soils and young plants from wind damage.

General management practices are outlined briefly in each capability unit description. Management practices suggested for different crops on different soils change as more and better information is gained from experience of workers at experiment stations and from the experience of growers and ranchers. Current information on kinds of crops, improved varieties of plants, and specific management practices can be obtained from a local representative of the Soil Conservation Service, the University of Florida Agricultural Experiment Stations, and the County Extension Service.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soil are grouped at three levels: the capability class, the subclass, and the unit. These levels are described in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use. (None in Brevard County.)

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices. (None in Brevard County.)

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion, but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or for esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife, or recreation.

For some soils, climate and one of the other kinds of limitation have about equal importance, and the subclass symbol shows both kinds; IIce is an example.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIIw-4 or VIs.-1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management of soils by capability units

The following mapping units are not assigned to capability units: Astatula-Urban land complex, Canaveral-Urban land complex, Galveston-Urban land complex, Myakka-Urban land complex, Paola-Urban land complex, Pomello-Urban land complex, Quartzipsamments, smoothed, Spoil banks, and Urban land. None are used for crops. With the exception of Quartzipsamments, smoothed, and Spoil banks, all are partly covered with houses and other buildings, streets, parking lots, and related structures. Quartzipsamments, smoothed, is an area of sandy soil material that has been reworked and shaped by earthmoving equipment primarily for use as

building sites, roadways, and recreational areas. Spoil banks are piles of soil material dug from ditches and canals or dredged from the ship channel in the Indian River.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained sandy soils in broad low areas, on flats and low ridges, in depressions and poorly defined drainageways, and in sloughs mostly in the flatwoods and hammocks. Most areas are slightly higher than adjacent lowlands. The water table is within depths of 10 to 40 inches for as much as 6 months or more in most years. It is generally within 10 inches of the surface in wet seasons, except in drained areas. In some areas these soils are subject to frost.

Natural fertility is low to high, and organic-matter content is moderate to low. The available water capacity is very low to moderate in the surface layer; roots of shallow-rooted plants are in this layer. Permeability is moderate to moderately rapid.

Simple drainage practices are effective on these soils, and a simple water control system is adequate to remove excess water after heavy rains and provide for subsurface irrigation in dry seasons. These soils respond well to fertilizer, but fertilizer is generally leached out rapidly and frequent applications are needed.

These soils are well suited to a variety of vegetable crops if a water control system is installed. They are best suited in areas that have the least frost hazard. In addition to drainage and irrigation, growing cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to the needs of the crops.

These soils are moderately well suited or well suited to citrus if they are well managed. A water control system is needed to maintain a constant water table at a depth of 3 feet or more. Bedding is needed where alternate strips about 30 feet wide are reworked to form wide ditches and elevated beds. Maintaining a good vegetative cover between the trees and frequent applications of fertilizer are other essential management needs.

These soils are well suited to high-quality pasture of improved grasses and clover. A simple drainage system is needed to remove excess surface water during heavy rains. A water control system that provides surface drainage and subsurface irrigation is needed to improve crop growth. Adequate applications of fertilizer and lime on pastures according to the needs of the plants and careful control of grazing are needed to maintain healthy plant growth.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level, very poorly drained sandy or loamy soils on wide flood plains, in low places, in sloughs, in marshy depressions, and along poorly defined drainageways. The water table is within a depth of 10 inches more than half the time. Low areas are subject to frost damage more frequently than higher areas.

Natural fertility is low to moderate, and organic-matter content is moderate to high. The available water capacity is moderate. Permeability is moderate to rapid.

These soils respond readily to simple drainage practices. Drainage is not feasible in isolated small areas that have no natural outlet. Where outlets are available, simple water control systems function well to remove excess water in wet seasons and provide for subsurface irrigation in dry seasons. In some areas dikes are needed to keep out water from adjacent wet areas.

These soils are well suited to a variety of vegetable crops if a water control system is installed. They are best suited in areas that have the least frost hazard. In addition to drainage and irrigation, growing cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to the needs of the crops.

These soils are poorly suited to citrus. If drainage and water control are adequate, they are well suited to high-quality pasture of improved grasses and clover. Adequate applications of fertilizer and lime according to the needs of the plants and control of grazing are needed to maintain healthy plant growth.

CAPABILITY UNIT IIIw-3

Bradenton fine sand, shallow variant, the only soil in this unit, is a nearly level, poorly drained soil on low marine terraces. It generally is slightly higher than adjacent, more poorly drained soils. In most areas hard limestone is within 40 inches of the surface. The water table generally is between depths of 10 and 30 inches, but rises to within 10 inches of the surface for 2 to 6 months in most years.

Natural fertility is medium, and organic-matter content is low. The available water capacity is high in the subsoil, but low in the surface and subsurface layers. Permeability is moderate to moderately rapid. This soil responds to simple, shallow drainage practices. The underlying hard limestone makes construction of deep drainage or water control systems difficult to design and install. In some areas this soil is more subject to frost damage than in others.

This soil is moderately well suited to a number of vegetable crops if water control is well established. Crops are best suited in areas that have the least frost hazard. In addition to drainage and irrigation, planting cover crops during fallow periods maintains organic-matter content and improves tilth. Fertilizer and lime should be applied according to the needs of the crops.

This soil is well suited to citrus if it is properly managed. Bedding, drainage, water table control, irrigation, and frequent applications of fertilizer are essential management needs.

If well managed, this soil is suited to high-quality pasture of improved grasses or grass and clover mixtures. A drainage system designed to remove excess surface water, liberal application of fertilizer, and control of grazing are essential needs of management.

CAPABILITY UNIT IIIw-4

This unit consists of nearly level, very poorly drained, organic soils in broad, wet areas on flood plains and in freshwater marshes and swamps. The water table is within 10 inches of the surface for 9 to 12 months of most years, and water stands on the surface in some places for 3 to 6 months and in many places, for 6 months or longer. The soils in this unit are frequently subject to frost damage.

Natural fertility is moderate to high, and organic-matter content is very high. The available water capacity

is high to very high in the organic layers. Permeability is moderate to rapid.

Where drainage outlets are available, simple drainage and irrigation systems can be installed and maintained easily. Because most areas are in the lowest positions on the landscape, dikes around the perimeter and pumps to lift the water over the dikes are needed for water control. In some areas these soils are more subject to frost damage than in others.

These soils are well suited to a wide variety of vegetable crops if a good water control system is established and maintained. They are best suited in areas that have the least frost hazard. In addition to maintaining the water control system, saturating the soil during fallow periods minimizes oxidation of the organic layers. Also, wetland cover crops should be grown in fallow periods. Fertilizer and lime should be applied according to the needs of the crops.

These soils are not suited to citrus. They have many soil properties that are unfavorable to citrus, and the drainage needs of this crop cause rapid deterioration of the soils.

If intensively managed, these soils are well suited to high-quality pasture of improved grasses and clover mixtures. A water control system to remove excess surface water and maintain the level of the water table, adequate applications of fertilizer and lime as required, and careful control of grazing are essential management needs.

CAPABILITY UNIT IIIs-1

Tavares fine sand, the only soil in this unit, is a nearly level to gently sloping sandy soil that has severe limitations for cultivated crops. Poor soil properties reduce the choice of plants and require special management, but the water table is favorable, generally within 40 to 60 inches of the surface.

Natural fertility and organic-matter content are low. The available water capacity is very low to low. Permeability is very rapid in the sandy layers, and little or no moisture is retained for shallow-rooted plants. The water table increases the supply of moisture for deeper rooted plants. This soil is well aerated and porous, and plant nutrients are quickly leached out.

Crops that increase content of organic matter are needed. Erosion and soil blowing are active in unprotected areas, but the management practices that improve the soil generally are adequate to control erosion.

This soil is poorly suited to most vegetable crops. Watermelons can be grown, but they need intensive soil improvement practices for the best yields. Returning all crop residue to the soil, planting green-manure crops, and applying adequate fertilizer and lime are management practices that help to maintain fertility and organic-matter content.

This soil is well suited to citrus. It is near coastal waters and generally is not subject to frost damage. Natural drainage generally is adequate for good tree growth, but trees are damaged in places by a high water table after unusually heavy rainfall. Generally, the roots of the trees extend into the moist area just above the water table, and therefore the trees are commonly not seriously affected by drought. In citrus groves, a cover crop between the trees and adequate amounts of fertilizer and lime are needed for good yields.

This soil is well suited to improved pasture. Deep-rooted grasses grow well if they are properly established, if enough fertilizer and lime are applied, and if grazing is controlled. Pasture on this soil is not adversely affected by drought to any great extent.

CAPABILITY UNIT IVw-1

This unit consists of nearly level, poorly drained sandy soils that are very severely limited for cultivated crops. Excessive wetness and poor soil properties reduce the choice of plants, and intensive management is required. Wetness is the main limitation.

Natural fertility and organic-matter content are low. The available water capacity is very low to low in the sandy layers and moderate in the loamy layers. Permeability is very rapid to moderate. Mineral fertilizer is lost rapidly through leaching.

Unless drained, these soils are not suited to cultivated crops. If drained and intensively managed, they are moderately well suited to vegetable crops. A well-designed, constructed, and maintained water control system that maintains the level of the water table and provides subsurface irrigation is an important management need. Crop rotations that protect and improve the soil and frequent applications of fertilizer and lime as needed are factors to be considered.

These soils are poorly suited to citrus. Because they are in low positions on the landscape and normally have a high water table, water control is difficult. A well-designed system of ditches and control structures and bedding are needed if citrus is planted. Possible frost damage should be considered before planting these soils to citrus. Maintaining fertility is difficult because the soils are sandy and low in fertility. Frequent applications of fertilizer are needed. During dry periods, irrigation is needed to insure good yields.

If intensively managed, these soils are well suited to improved pasture of grasses or grass and clover. A water control system that is less intensive, but is otherwise similar to that required for cultivated crops, frequent applications of fertilizer and lime as required, and careful control of grazing are essential management needs.

CAPABILITY UNIT IVw-2

This unit consists of nearly level, poorly drained, sandy soils that have very severe limitations for cultivated crops, because periodic excessive wetness and poor soil properties reduce the choice of plants and require intensive management.

Natural fertility and organic-matter content are low. The available water capacity is very low to low in the sandy layers and moderate in the weakly cemented layers. Permeability is moderate to very rapid in the least permeable layers. The water table fluctuates within the soil and is at or near the surface during wet periods. These soils are normally droughty in dry seasons and saturated in wet seasons. Mineral fertilizer is leached out rapidly.

These soils are moderately well suited to vegetable crops if other factors make these crops feasible, such as the availability of irrigation water and freedom from frost hazard. Intensive management is necessary and a very careful control of the water table level is essential. Drainage-subirrigation systems that provide rapid removal of excess water in rainy seasons and a means of

irrigation in dry seasons should be carefully designed, installed, and maintained. Use of grass or other close-growing crops three-fourths of the time to protect and improve the soil and frequent, heavy applications of lime and fertilizer are essential management needs.

These soils are poorly suited to citrus. Such factors as poor drainage, susceptibility to freezing temperatures, rapid leaching of plant nutrients, and droughtiness in dry periods adversely affect the growth of citrus. If conditions are favorable and groves are well managed, citrus trees can be grown successfully. A properly designed water control system and a protective vegetative cover are management needs. A careful study of the site should be made before citrus groves are planned.

If a drainage system is established to remove excess water during wet seasons, a high-quality pasture of improved grasses can be maintained on these soils. Large applications of fertilizer and lime are required. Clover can be grown successfully with grasses, but irrigation similar to that used for cultivated crops is required to assure good plant growth.

CAPABILITY UNIT IVw-3

Copeland complex, the only mapping unit in this unit, consists of very poorly drained, nearly level soils that are underlain by limestone. These soils have very severe limitations for cultivated crops. Wetness and a shallow root zone reduce the choice of plants and require special management.

Organic-matter content in the surface layer is high. The available water capacity is moderate. The root zone is shallow to moderately deep. Permeability is moderately rapid in the surface layer and moderate in the subsoil. The hard limestone has cracks and crevices, and water moves through it readily.

These soils are poorly suited to vegetables or other cultivated crops because they are wet and shallow to moderately deep. The surface layer generally has good soil properties, but in some places the soil is shallow enough for underlying rock to interfere with preparation of the soil. The root zone is limited. The underlying rock makes adequate drainage difficult to establish.

These soils are poorly suited to citrus. Management is difficult. The underlying limestone makes adequate drainage systems very difficult to establish. Bedding that provides a minimum root zone generally is necessary, but is very difficult to accomplish.

These soils are well suited to improved pasture of grass and clover, but clearing densely forested hammock areas is expensive. Good surface drainage, heavy applications of fertilizer, and controlled grazing are needed for good yields.

CAPABILITY UNIT IVs-1

Astatula fine sand, dark surface, the only soil in this unit, is a nearly level and gently sloping sandy soil that has very severe limitations for cultivated crops. Poor soil properties reduce the choice of plants and require special management.

Natural fertility and organic-matter content are low. The available water capacity is low. Permeability is very rapid. Plant nutrients are quickly leached through the porous soil. Erosion generally is not a serious hazard.

This soil is very severely limited in its use for most vegetable crops or other cultivated crops. If intensively managed, it is moderately well suited to a few special crops, such as watermelons. Adequate applications of fertilizer and a system of crop rotation that includes soil-improving cover crops are needed.

This soil is well suited to citrus. It is near coastal waters and is not generally affected by frost. Growing a cover crop between the trees, applying lime and fertilizer, and irrigating during dry periods are good management practices.

If properly managed, this soil is moderately well suited to pangolagrass, bahiagrass, and other deep-rooted improved pasture grasses. Hairy indigo, crotalaria, and other deep-rooted legumes can be grown successfully, but careful management is required to maintain a good vegetative cover.

CAPABILITY UNIT IVs-2

Orsino fine sand, the only soil in this unit, is a nearly level, moderately well drained sandy soil that has very severe limitations for cultivated crops. Poor soil properties severely reduce the choice of plants. The level of the water table is favorable in some seasons.

Natural fertility and organic-matter content are low. The available water capacity is very low. Permeability is rapid because the soil is very porous. The moist zone above the water table increases the supply of moisture for deep-rooted plants. Plant nutrients are leached out very quickly. Water erosion is not a hazard, but soil blowing is a hazard in unprotected areas.

This soil is very poorly suited to vegetable crops and other cultivated crops. If intensively managed, it is moderately well suited to citrus. Irrigation and frequent applications of fertilizer are needed.

If intensively managed, this soil is moderately well suited to improved pasture grass. Bahiagrass and other deep-rooted, drought-resistant grasses grow moderately well if they are adequately fertilized and limed and if grazing is carefully controlled.

CAPABILITY UNIT IVs-3

Cocoa sand, the only soil in this unit, is a nearly level to gently sloping, well-drained sandy soil that has very severe limitations for cultivated crops. Poor soil properties reduce the choice of plants and require special management. Coquina rock is at a depth of 20 to 54 inches.

Natural fertility and organic-matter content are low. The available water capacity is very low in the sandy layers and low in the loamy sand layer. Permeability is rapid, and water moves quickly through the soil and the porous coquina rock. Plant nutrients are leached out quickly. In many places the root zone is shallow. Erosion generally is not a serious hazard. Practices that improve the retention of water and plant nutrients generally are sufficient to control erosion.

This soil is poorly suited to most vegetable crops and other cultivated crops. It is moderately well suited to watermelons. Adequate applications of fertilizer and a system of crop rotation that includes soil-improving cover crops are needed.

This soil is well suited to citrus. It is near coastal waters and generally is not affected by frost hazard. Growing a cover crop between the trees, applying lime and fertilizer, and irrigating during dry periods are good management practices.

This soil is moderately well suited to improved pasture grasses. Shallowness limits root development and makes grasses vulnerable to drought.

CAPABILITY UNIT Vw-1

St. Johns soils, ponded, the only mapping unit in this unit, are nearly level, very poorly drained sandy soils in depressions that are covered with water for 6 months or more in most years.

Natural fertility is low. Organic-matter content is moderate in the surface layer and weakly cemented layers. The available water capacity is moderate in the surface layer. Permeability is very rapid in all but the weakly cemented layer, where it is moderate.

These soils are not suited to citrus or vegetables or other cultivated crops because they are continually wet. Drainage is impractical. Lack of available drainage outlets makes water management very difficult. Reclaiming these soils is generally not feasible.

These soils are poorly suited to pasture grasses. During very dry years, however, pasture grasses can be established.

CAPABILITY UNIT VIw-1

This unit consists of nearly level, very poorly drained sandy soils in depressions in the flatwoods. These soils are covered with a few inches of water for 6 months or more in most years.

Natural fertility is low to moderate, and organic-matter content is low. Permeability is moderate to rapid.

These soils generally are not suited to vegetables, other cultivated crops, or citrus. The main limitation is excessive wetness. Lack of available drainage outlets in many places makes water management difficult and generally impractical.

CAPABILITY UNIT VIs-1

Paola fine sand, 0 to 5 percent slopes, the only soil in this unit, is a nearly level to gently sloping, excessively drained soil on high dunelike ridges. It generally is not suited to cultivated crops, because it is droughty and has many other poor soil properties.

Natural fertility is low. The available water capacity is very low. Permeability is very rapid, and as a result, plant nutrients are lost rapidly through leaching.

This soil is not suited to vegetable crops and most cultivated crops. Where the climate is favorable, this soil is moderately well suited to citrus. In citrus groves, a cover crop or a cover of weeds and grasses between the trees is needed to protect the soil from blowing. Tillage should be kept to a minimum. Sprinkler irrigation is needed to insure the survival of young trees and a good yield of fruit from mature trees.

This soil is poorly suited to improved pastures of bahiagrass and other deep-rooted grasses. In such pastures, frequent applications of fertilizer and carefully controlled grazing are needed.

CAPABILITY UNIT VIs-2

Welaka sand, the only soil in this unit, is a nearly level, well-drained soil.

This soil is porous, highly leached, and droughty. Natural fertility and organic-matter content are low. The available water capacity is very low. Permeability is very rapid.

This soil generally is not suited to cultivated crops because it is droughty and has many other poor soil properties. The main limitations are the very low available water capacity and the high degree of leaching. This soil is poorly suited to citrus. It is poorly suited to improved pasture of bahiagrass and other deep-rooted, drought-resistant grasses. In such pastures, frequent applications of fertilizer and carefully controlled grazing are needed

CAPABILITY UNIT VIs-3

This unit consists of nearly level, moderately well drained and somewhat poorly drained sandy soils that generally are not suited to cultivation because of poor soil properties.

These soils are porous, highly leached, and droughty, except in wet periods. Natural fertility and organic-matter content are low. The available water capacity is very low. Permeability is very rapid to moderately rapid in the least permeable layers.

The main limitations are the very low available water capacity and the high degree of leaching. These soils are not suited to row crops or most vegetable crops and are poorly suited to citrus. They are moderately well suited to watermelons. Adequate applications of fertilizer and a system of crop rotation that includes soil-improving cover crops are needed. Bahiagrass and other deep-rooted, drought-resistant grasses are poorly suited, even if large amounts of fertilizer and lime are applied.

CAPABILITY UNIT VIs-4

Canaveral complex, gently undulating, the only mapping unit in this unit, consists of nearly level to gently sloping, moderately well drained sandy soils that contain shell fragments.

These soils are calcareous and occasionally receive salt spray from the ocean. Natural fertility and organic-matter content are low. The available water capacity is very low. Permeability is very rapid. The moist zone above the water table increases the supply of moisture for deep-rooted plants. Plant nutrients are leached out very quickly. Water erosion is not a hazard, but soil blowing is active in unprotected areas.

These soils are not suited to vegetable crops or most cultivated crops. They are not suited to citrus. They are poorly suited to deep-rooted, improved grasses and produce only fair pastures, even under careful management.

CAPABILITY UNIT VIIw-1

This unit consists of nearly level, poorly drained and very poorly drained soils on flood plains and in low areas that are flooded most of the year or for long periods. Soil properties vary.

These soils are not suited to vegetable or other cultivated crops or to citrus or improved pasture grasses and clover. Controlling wetness and flooding would require major reclamation. Under existing conditions, major reclamation projects are not feasible.

CAPABILITY UNIT VIIw-2

Myakka sand, ponded, the only soil in this unit, is a nearly level soil in depressions that are flooded for long periods.

Natural fertility and organic-matter content are low. The available water capacity is very low to low in the

surface and subsurface layers and moderate in the weakly cemented layers. Permeability is moderate in the least permeable layer.

This soil is not suited to vegetable crops, other cultivated crops, improved pasture, or citrus, as a result of prolonged flooding. Drainage is difficult. Adequate drainage outlets are lacking in most places.

CAPABILITY UNIT VIIs-1

This unit consists of nearly level to strongly sloping, excessively drained sandy soils.

Natural fertility and organic-matter content are low. The available water capacity is very low. Permeability is very rapid, and leaching is high.

These soils are not suited to vegetable crops, other cultivated crops, improved pasture, or citrus.

CAPABILITY UNIT VIIs-2

Palm Beach sand, the only soil in this unit, is a nearly level and gently sloping, excessively drained soil that is made up of sand and shell fragments. This soil is droughty and has many other poor soil properties.

This soil is mildly or moderately alkaline, and it frequently receives salt spray from the ocean. It is very porous, and water moves very rapidly through it. Only a very little water is retained in the root zone. The available water capacity is very low. Natural fertility and organic-matter content are low. Soil blowing is active in some places.

Because this soil has very poor soil properties it has very limited use. It is not suited to vegetable crops, other cultivated crops, improved pasture, or citrus.

CAPABILITY UNIT VIIIw-1

Coastal beaches, the only soil in this unit, is a nearly level or gently sloping sandy and shelly soil along the shoreline. It generally is flooded with salt water during storms and daily high tides.

This soil generally is bare of vegetation. Adverse water relationships, salinity, fertility, and other properties make its use for plants extremely limited. Native vegetation is limited to scattered areas of salt-tolerant plants of little or no economic value.

This soil is not suited to crop production or pasture. It is suited mainly to recreation and wildlife habitat. It has great esthetic value, and makes up an important part of the waterfront.

CAPABILITY UNIT VIIIw-2

This unit consists of nearly level areas along the coast and stream outlets that are covered by brackish water or daily high tides. These areas generally have a cover of salt-tolerant and water-tolerant vegetation of limited economic value. Low position, salinity, flooding by tides, and other adverse conditions make them unsuited to commercial crops or pasture.

This unit is suited mainly to wildlife habitat and recreation. Wildlife habitat is important ecologically and provides essential food, cover, and breeding grounds for many species. Related recreation is important in some areas, but some areas of this tidal resource are undergoing conversion to other uses.

Estimated Yields

Table 4 shows the estimated average yields per acre of the main crops in the county. These are yields that can be expected under the generally high-level management used in the county. On soils used for crops and groves, these practices include applying adequate amounts of fertilizer and lime, controlling insects, managing crop residue properly, supplying drainage if needed, controlling runoff and erosion, and installing properly designed irrigation systems. Management on soils used for improved pasture includes applying adequate amounts of fertilizer and lime, controlling grazing, rotating pasture, using good varieties of plants and plant mixtures, controlling undesirable plants, draining excess water, and irrigating if feasible and needed.

The yields in table 4 are based largely on information obtained from observations, from interviews with farmers, from records and experience of the local district conservationist, from bulletins and other information compiled by the University of Florida Agricultural Experiment Stations, from comparison of yields on similar soils in other counties in central Florida, and from records of crop yields kept by the Florida Crop Reporting Service. The yield estimates assume optimum weather conditions.

Range and Grazeable Woodland

About 190,000 acres on the mainland west of the coastal ridge is used as native range by domestic livestock. Native grasses are an important part of the overall, year-round supply of forage. This forage is readily available, can be grown cheaply, and provides important roughage needed by cattle. Present day cow-calf operations depend heavily on these forage resources.

Range sites and condition classes

Range sites are distinctive kinds of range. Each has significant differences in the kinds and amounts of climax vegetation it produces, and each requires different management. Range sites are distinguished by differences in climate, topography, and kinds of soil.

The vegetation that grew originally on a site is called the climax vegetation. It generally is the most productive and most suitable vegetation for that particular site, and it maintains itself as long as the environment does not change. The climax vegetation consists mainly of three kinds of plants according to their response to grazing—decreasers, increasers, and invaders.

Decreasers generally are the most palatable climax plants, and they are eliminated if the range is under continuous heavy grazing. Increasers are plants less palatable to livestock; they increase for a while under continuous heavy grazing, but are finally eliminated under continual heavy grazing. Invaders are plants native to the site in small amounts and have little value for forage, but they become established after the other vegetation has been reduced.

Range condition is the present state of the vegetation in relation to the climax vegetation of the site. A range in excellent condition has 76 to 100 percent, by weight, of the climax vegetation; one in good condition, 51 to 75

TABLE 4.—*Estimated average yields per acre of citrus crops, vegetable crops, and improved pasture on arable soils under high level management*

[Absence of a yield figure indicates the soil is not suited to the crop specified or data are not available]

Soil	Citrus crops			Vegetable crops		Permanent improved pasture		
	Oranges	Grapefruit	Tomatoes	Cabbage	Sweet-corn	Water-melons	Grass	Grass-clover
	Boxes	*Boxes*	*40-lb. boxes*	*50-lb. crate or bag*	*40 to 60-lb. crates*	*Marketable lb./acre*	*Animal-unit-months* [1]	*Animal-unit-months* [1]
Anclote sand			700	480	180		9.0	11.0
Astatula fine sand, dark surface	450	650				7,200	6.5	
Basinger sand	300	550	625	400	160		7.5	9.5
Bradenton fine sand, shallow variant	425	625						
Canova peat				480	180		15.0	20.0
Chobee sandy loam				480	180		10.0	15.0
Cocoa sand	500	700				9,000	7.0	
Copeland complex	375	575					8.0	10.0
Eau Gallie sand	375	575	625	320	160	10,000	7.0	9.5
Eau Gallie sand, bedded	375	575						
Felda sand	425	625	650	400	160		7.5	10.5
Felda sand, bedded	425	625						
Felda and Winder soils	425	625	650	400	160		7.5	10.5
Floridana sand			700	480	180		9.0	11.0
Holopaw sand	325	375	650	400	160		7.5	10.5
Immokalee sand	350	550	625	320	160	10,000	7.0	9.5
Malabar sand	325	575	650	400	160		7.5	10.5
Malabar, Holopaw, and Pineda soils	325	575	650	400	160		7.5	10.5
Micco peat				480	180		25.0	30.0
Montverde peat				480	180		25.0	30.0
Myakka sand	350	550	625	320	160	10,000	7.0	9.5
Oldsmar sand	375	575	625	320	160	10,000	7.0	9.5
Orsino fine sand	350	450					5.0	
Paola fine sand, 0 to 5 percent slopes	300	400					3.5	
Parkwood fine sand, moderately fine subsoil variant	450	650	700	480	180		9.0	11.0
Pineda sand	400	600	650	400	160		7.0	10.5
Pineda sand, bedded	400	600						
Pineda sand, dark surface variant	400	600	700	480	180		9.0	11.0
Pomello sand						10,000	5.6	
Pompano sand	300	550	650	400	160		7.5	10.5
Satellite sand						10,000	5.0	
St. Johns sand	350	550	700	480	180	10,000	9.0	11.0
Tavares fine sand	425	600				8,000	8.0	
Terra Ceia muck				480	180		25.0	30.0
Tomoka muck				480	180		25.0	30.0
Valkaria sand	300	550	650	400	160		7.5	10.5
Wabasso sand	425	650	625	320	160	10,000	7.0	9.5
Winder loamy sand	425	625	650	440	160		7.5	10.5

[1] Animal-unit-month refers to the number of months during a normal growing season that 1 acre will provide grazing for one animal unit without injury to the sod. One animal unit is defined as one cow, horse, or steer; five hogs; or seven sheep.

percent; one in fair condition, 26 to 60 percent; and one in poor condition, less than 25 percent.

Grazeable woodland

Grazeable woodland is forest that has an understory of native grasses, legumes, and forbs. The understory is an integral part of the forest plant community. The native plants can be grazed without significantly impairing other forest values. On such forest land, grazing is compatible with timber management if it is controlled or managed in such a manner that timber and forage resources are maintained or enhanced.

Forage production of grazeable woodland varies according to (a) different kinds of grazeable woodland; (b) amount of shade cast by the canopy; (c) accumulation of fallen needles; (d) the influence of time and intensity of grazing on the presence or absence of grass species and forage production; and (e) the number, size and spacing, and method of site preparation of tree plantings.

Descriptions of sites

The following mapping units have little, if any, potential for range and are not assigned to range sites: Astatula-Urban land complex; Canaveral-Urban land complex; Coastal beaches; EauGallie sand, bedded; Felda sand, bedded; Galveston-Urban land complex; Myakka-Urban land complex; Paola-Urban land complex; Pineda sand, bedded; Pomello-Urban land complex; Quartzipsamments, smoothed; Spoil banks; Tidal

swamp; and Urban land. Quartzipsamments, smoothed; Urban land; and the soils that are in Urban land complexes are used for houses, roads, commercial buildings, recreational areas, and related purposes. EauGallie sand, bedded; Felda sand, bedded; and Pineda sand, bedded, are used almost exclusively for citrus. Spoil banks are man made. They may occur in association with any range site. They support a few forage species, but have little potential for range. Tidal swamp, at about mean sea level, is covered with a dense, tangled growth of mangrove trees and roots. It has little potential for range.

ACID FLATWOODS RANGE SITE

This range site consists of nearly level, acid, poorly drained or somewhat poorly drained sandy soils. All the soils are extremely acid to strongly acid or very strongly acid to medium acid in the surface layer and subsurface layer; some of them are acid in all layers. The soils have a sandy surface layer and subsurface layer, and most of them have a weakly cemented, dark-colored layer within a depth of 50 inches. The water table fluctuates. In poorly drained soils it is at the surface during wet periods.

This extensive site originally supported an open forest of slash and longleaf pine. An open canopy permitted the growth of an understory of grasses and forbs. The climax grasses now on this site are creeping bluestem, lopsided indiangrass, chalky bluestem, Florida paspalum, brownseed paspalum, switchgrass, and hairy panicum. Grassleaf goldaster, deerstongue, and swamp sunflower are among the principal forbs. The main increasers are blue maidencane, pineland three-awn, and broomsedge bluestem. The most common invaders are carpetgrass, bottlebrush three-awn, pineywoods dropseed, and annuals. To some extent, gallberry, saw-palmetto, and waxmyrtle were under the canopy of the original pine forest. They have now increased to the extent that they make up the characteristic vegetation of the site (fig. 8).

The production of forage in woodland areas varies, depending on the age of the stand, the density of the canopy, and the extent to which needles have accumulated. If the site is in good to excellent condition, yields, based on plot clippings, average 3,500 to 6,000 pounds of air-dry herbage per acre.

FRESH MARSH (MINERAL) RANGE SITE

This range site consists of nearly level, poorly drained to very poorly drained soils that are mostly slightly acid in the surface layer, but range from strongly acid to mildly alkaline. These soils generally become less acid or

Figure 8.—Scattered young pine trees, saw-palmetto, and a variety of native grasses on a typical Acid Flatwoods range site of Myakka sand.

more alkaline with increasing depth. They have a sandy or loamy surface layer and a loamy subsoil. They are at a slightly lower elevation than the Acid Flatwoods range site, commonly adjacent to this site. The water table is within a depth of 10 inches much of the time. These soils are subject to flooding, and some are flooded for long periods. The St. Johns River frequently overflows some areas of this site.

This extensive range site originally supported a climax vegetation mainly of native maidencane. The climax vegetation now is scattered cabbage palms that grow on the slightly elevated rises within the marsh, sand cordgrass, giant cutgrass, and perennial sedges and rushes. The main increasers are sand cordgrass, field paspalum, and broomsedge bluestem. Common invaders are carpetgrass, bermudagrass, and many annual grasses and weeds. Other invaders are smartweed, iris, willow primrose, and pickerelweed. Waxmyrtle is the main woody invader.

If the site is in good to excellent condition, yields, based on plot clippings, average 5,000 to 7,000 pounds of air-dry herbage per acre.

FRESH MARSH (ORGANIC) RANGE SITE

This range site consists of nearly level, very poorly drained organic soils that are covered by water for long periods. The layers of peat or muck are 5 inches to more than 80 inches thick. Organic layers range from extremely acid to moderately alkaline. Underlying materials are sandy and loamy. Most areas are large and occur on the flood plain of the St. Johns River, but smaller areas are scattered throughout the county, except on the Atlantic Coastal Ridge.

Large areas of this range site originally supported a climax vegetation mainly of native maidencane, giant cutgrass, perennial sedges, and rushes. The principal increasers are pickerelweed, duckpotato, and sawgrass. Common invaders are annuals, redroot, willow primrose, Ft. Thompson grass, and lizardtail.

If this site is in good or excellent condition, yields average 8,000 to 10,000 pounds of air-dry herbage per acre. If the site is in poor or fair condition, yields average 1,000 to 2,000 pounds of air-dry herbage per acre.

HAMMOCK RANGE SITE

This range site consists of nearly level, poorly drained or very poorly drained, medium acid to moderately alkaline soils. These soils have a sandy surface layer and a loamy subsoil. Moisture conditions are favorable for a dense growth of trees, shrubs, vines, and other plants. Where hammocks are in association with marsh, swamp, or slough areas they occupy islandlike positions, slightly higher than surrounding areas, and generally are dominated by cabbage palms. In association with flatwoods areas, hammocks generally occupy slightly lower positions and in some places are dominated by cabbage palm, pine, or oak.

This site is a true forest site and has a climax vegetation of overstory trees including pine, palm, and hardwoods. It supports a luxuriant undergrowth of shrubs and vines and grasses in the small openings. The main trees are cabbage palm, live oak, magnolia, fiscus, persimmon, and slash pine. Important shrubs are holly, waxmyrtle, bay, sawbrier, Virginia creeper, and French mulberry. Decreaser grasses are eastern gamagrass, beaked panicums, bluestems, longleaf uniola, and low panicums. Because the canopy is dense, forage production is limited. Soil conditions are favorable, however, and the forage is of high quality. The site is used extensively for shade, shelter, and browsing.

Making reliable estimates of actual pounds of air-dry herbage is difficult. No plot clippings have been taken. Based on observation, average yields of total air-dry herbage are high if the tree canopy is less than 50 percent.

SALT MARSH (MINERAL) RANGE SITE

This range site consists of nearly level soils that are regularly covered by salt water or brackish water at high tide. These soils are inundated to a depth of a few inches by regular tidal action or flooded with brackish water. Storms occasionally cause extremely high tides that cause flooding as deep as 2 to 3 feet. This range site also includes areas of poorly drained soils, formerly covered with salt water, that are now diked and flooded with fresh water for 6 months or more in most years. Soils are mainly mineral and have excellent supportability for livestock, equipment, and walkways.

This range site supports a climax vegetation of decreaser species, mainly marshhay cordgrass, big cordgrass, smooth cordgrass, Olney bulrush, switchgrass, saltmarsh bulrush, and bush seaoxeye. Increasers are seashore saltgrass, seashore paspalum, hollowstem spike rush, and black needlerush. Decreasers make up about 80 percent of this open natural grassland, and increasers 20 percent. Salt marsh vegetation generally occurs in distinct zones separated by small differences in elevation or degree of salinity. Salt marsh plants are consistent in their reaction to grazing. Relatively few species of plants are represented in the scale of plant succession on salt marsh.

If the site is in good to excellent condition, the yield, based on plot clippings, averages 6,000 to 8,000 pounds of air-dry herbage per acre. If the range is in poor condition, it is dominated by black needlerush that has no forage value.

SANDHILL RANGE SITE

This range site consists of nearly level and gently sloping sands and fine sands on ridges. These soils are moderately well drained to excessively drained and have low to very low available water capacity. In a few places coquina rock is at a depth of 20 to 54 inches.

This site supports a climax vegetation mostly of open longleaf pine forest that includes scattered turkey oak, bluejack oak, other kinds of oak, and an understory of decreaser and increaser grasses and forbs. Creeping bluestem, indiangrass, needlegrass, splitbeard bluestem, purple lovegrass, and forbs are the main decreasers. The principal increasers are pineland three-awn, pineland dropseed, low panicum, broomsedge, turkey oak, bluejack oak, and runner oak. Invaders are natalgrass, pricklypear, persimmon, and annuals.

The production of forage under woodland use varies, depending on the age of the stand and the density of the canopy. If the site is in good to excellent condition, yields average 2,000 to 4,000 pounds of air-dry herbage per acre. If the site is in poor condition, yields average 1,000 to 2,000 pounds of air-dry herbage per acre.

SAND POND RANGE SITE

This range site consists of nearly level, very strongly acid to mildly alkaline, poorly drained soils in shallow ponds, depressions, and sloughs that are flooded for more than 6 months in most years (fig. 9). Scattered areas of this range site occur throughout the flatwoods.

Many landowners commonly refer to this site as a grassy pond because the original grass cover was maidencane. Areas that support vegetation occur as circular bands. The vegetation varies somewhat, depending on the soils. The small areas of organic soils that occur within the site generally support sawgrass if they are nonacid, or maidencane, cutgrass, and pickerelweed if they are acid. The centers of some areas, where the site is flooded for the longest time, support pure stands of cypress trees. Outward from the center on the more sandy soils, smaller amounts of maidencane and related species occur in association with St.-Johnswort, a woody shrub of no grazing value. Increasers include sand cordgrass, low panicum, stiff paspalum, and species of nut rushes. Invaders are blanketgrass, matchweed, pipeworts, pickerelweed, and iris.

The production of forage varies greatly, depending on the amount of standing water. Little forage, if any, is produced from sawgrass or cypress. If the site is in excellent condition, yields of maidencane and small amounts of pickerelweed average 2,000 to 3,000 pounds of air-dry forage per acre. On sandy soils, yields of maidencane and St. Johnswort average 2,500 to 3,500 pounds of air-dry forage per acre.

SAND SCRUB RANGE SITE

This site consists of nearly level to strongly sloping, moderately well drained to excessively drained sandy soils on ridges and knolls. These soils are highly leached. They have very low available water capacity, and as a result they have little value for production of forage.

This site supports a climax vegetation mainly of sand pine and scattered sand hickory, scrub hickory, turkey oak, and bluejack oak. The understory consists mainly of runner oak, saw-palmetto, yucca, pricklypear, rosemary, wild olive, and sand bay. Sparse scattered stands of Florida bluestem, pineland three-awn, corkscrew three-awn, and low panicum occur on this site.

Only a small amount of desirable forage is obtained. Yields are so low that the site should be disregarded when native forage resources are evaluated.

SLOUGH RANGE SITE

This range site consists of nearly level, poorly drained to very poorly drained sandy soils. It is at a lower elevation than the surrounding Acid Flatwoods site. In places

Figure 9.—Thick growth of St.-Johnswort on Sand Pond range site. The soil is Myakka sand, ponded.

it is in narrow wet areas and poorly defined drainageways that meander through areas of the Acid Flatwoods site. The soils range from very strongly acid to moderately alkaline. The water table is within a depth of 10 inches for long periods, and during periods of heavy rainfall the soils are subject to flooding.

This site originally supported a climax vegetation of maidencane. Scattered cabbage palms grew on the knolls and in a ring around the outer edges of some areas. Other climax plants are giant cutgrass, sawgrass, and rushes. The main increasers are broomsedge bluestem, shortspike bluestem, lovegrass, hair-awn muhly, sand cordgrass, and pineland three-awn. Common invaders are knotroot bristlegrass, low panicum, carpetgrass, and annuals (fig. 10).

If the site is in good or excellent condition, yields, based on plot clippings, average 2,000 to 4,000 pounds of air-dry herbage per acre.

SWAMP RANGE SITE

This site is made up of poorly drained or very poorly drained soils that are covered by water most of the year. These soils are in drainageways, in large bay heads, or in depressions that have no outlets. Many areas are inaccessible because they are covered by water.

The dense canopy of wetland hardwoods and the excess water on this site reduce the production of forage in the understory. Desirable grasses, however, grow along the outer edges of the site where the water level is lower and the canopy is less dense than in the other areas. The canopy varies from a pure stand of species, such as cypress, to a mixed stand made up of many species. The main species are baldcypress, pondcypress, planertree, swamp ash, swamp maple, and several species of gum and sweetbay. Climax grasses that grow along the outer margins of this site include maidencane, blue maidencane, chalky bluestem, and beaked panicum. Pond apple, waxmyrtle, storax, lizardtail, brackenfern, and pickerelweed are the main woody plants. Waxmyrtle is a serious invader along the outer margins of this site.

If this site has a crown canopy of about 40 percent, yields average 1,500 to 2,500 pounds of air-dry herbage per acre.

SWEET FLATWOODS RANGE SITE

This range site consists of nearly level, poorly drained sandy soils. These soils range from strongly acid to moderately alkaline in the surface layer and generally become less acid or more alkaline with increasing depth.

This site is interspersed with small sand ponds and

Figure 10.—**An area of Basinger sand in the Slough range site. Heavy grazing has resulted in the invasion of carpetgrass, a common invader.**

narrow sloughs. The water table fluctuates. During part of the wet season it is within a depth of 10 inches.

This extensive site originally supported an open forest of slash and longleaf pine. Most of this has been cut over. An open canopy permits an understory of herbaceous vegetation. About 60 percent of the understory consists of decreaser grasses, including creeping bluestem, Florida three-awn, Florida paspalum, tall three-awn, and switchgrass. Deerstongue, grassleaf goldaster, and swamp sunflower are the main climax forbs. Excessive and continued grazing on the more palatable decreasers cause the site to retrogress to a species composition of increasers, such as broomsedge bluestem, toothachegrass, blue maidencane, chalky bluestem, pineland three-awn, and species of low panicums.

The production of forage under woodland use varies, depending on the age of the stand, the density of the crown canopy, and the extent to which needles have accumulated. If the site is in good to excellent condition, yields, based on plot clippings, average 4,500 to 9,000 pounds of air-dry herbage per acre. If the site is in poor to fair condition, yields average 2,000 to 4,000 pounds of air-dry herbage per acre.

Major grazing management practices

Grazing native grass resources means to graze the key forage species at an intensity that maintains or improves the quality and quantity of the desirable native grasses and wildlife plants. The best yields of native grasses can be obtained only if the plants are allowed to accumulate a supply of carbohydrates in their roots each season. Sufficient top growth must be left, especially in fall, to build up a reserve in the root system.

Proper grazing use.—The number of cattle and the length of time the range is grazed should be regulated, so that no more than half the current season's growth of the key species, by weight, is removed. When more than half is continually removed, the most desirable plants are weakened and eventually die out and are replaced by weeds, brush, and other undesirable plants.

Deferred grazing.—This conservation practice is designed to periodically postpone the grazing or to rest native grazing land for a prescribed period during any growth period of the year. This promotes the natural increase of desirable forage species and builds up a supply of emergency feed for drought periods or winter use.

Brush control.—By killing or suppressing undesirable brush species on native grazing lands, the more desirable grasses are permitted to grow and spread normally. Thus, more efficient use is made of the soil moisture and nutrients. Brush control also improves wildlife habitat and increases food production for wildlife.

Woodland

This section contains information about the relationship between soils and trees. It informs landowners and operators of the capability of soils to produce trees and suggests suitable management.

The 1968 Conservation Needs Inventory shows that about 193,000 acres of commercial forests and 24,000 acres of noncommercial forests are in Brevard County. This is about 33 percent of the total area of the county. Not all of this forest is in private ownership.

The present commercial woodlands, most of which are understocked, are dominated by pine. This open woodland is the result of clearcutting, use by wildlife, and other detrimental or inhibiting causes. About 143,000 acres of woodland is grazed by cattle. Tree growth is suppressed in these areas. These areas could be much improved as woodland by interplanting and managing the areas to encourage tree growth.

The noncommercial forests of the county consist mostly of cabbage palm hammocks scattered throughout the St. Johns River Basin and mangrove swamps along the Indian and Banana Rivers.

The original extensive pine forests of the county were cut about 50 years ago. Only a very few small groves of original pines are still on Merritt Island. The forests are second growth. Cypress and hardwoods now growing in the county are generally of poor commercial quality and are not being harvested at this time. There are no sawmills. Very little pulpwood is shipped out of the county.

General woodland management

A well-managed stand of trees helps to prevent soil deterioration and helps to conserve soil and water resources. One of the primary functions of good trees is to protect the soil. Trees slow the fall of raindrops and allow the soil to absorb more moisture. Erosion is not an important factor in most of the county, but the ability of tree cover to allow more moisture to enter the soil is important to ground water supplies. Properly managed forests could be an important part of the direct and indirect economy of the county. Managed forests total only about 3,000 acres. Practices to be considered in achieving proper management are defined briefly in the following paragraphs.

Protection from wildfires.—Trees and ground cover are destroyed by uncontrolled wildfires. Trees not killed are slowed in growth and may be scarred, which allows the entry of insects and diseases. Fire lessens the ability of the soil to absorb water and consume litter that contributes organic matter to the soil.

There is no countywide fire protection. Individual landowners, however, should observe all rules of fire protection. Firebreaks should be constructed and maintained around and through all woodlands. These fire breaks can slow or stop a fire under normal conditions.

Water management.—Management of water in woodlands is an important factor in starting and maintaining normal growth of pine trees. Most of the county consists of nearly level soils that have a high water table. A properly designed system of shallow ditches to remove excess surface water should be installed. The ditches would provide a suitable outlet and drain all ponded areas. An additional consideration should be to establish new plantings on low "beds" or ridges to provide a zone above the water table for optimum root development.

Tree planting.—Most of the woodland of the county is understocked and in need of stand improvement (fig. 11). Tree farming is a good land use in many areas. Idle land can be profitably utilized by growing desirable trees. Pines can grow on a variety of soils and require minimum care.

Figure 11.—**Open stand of longleaf pine and scattered oaks on Astatula fine sand, dark surface. Sites such as this can support denser stands of pine.**

Proper cutting practices.—To profit most from good woodland, a forest owner should use proper cutting practices. Proper practices vary as the condition of the woodland varies. Landowners should seek the advice of local soil conservationists, Soil Conservation Service, or representatives of the Florida Forest Service.

Woodland suitability groups

Soils vary greatly in their suitability for trees. The capability of a soil to grow trees is affected by the effective depth of the root zone and the ability of the soil to supply moisture. Other significant soil characteristics are thickness and texture of the surface layer, amount of organic matter, depth to fine-textured material, aeration of the soil, and depth to the water table.

To assist owners in planning woodland management, most of the soils of Brevard County suitable for trees have been assigned to woodland suitability groups. Each group consists of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity.

Some areas mapped in the county are not assigned to woodland groups. The uses of Urban land, for example, and of soils in the Urban land complexes preclude their use for the commercial production of pine trees. Canova peat, Micco peat, Montverde peat, Terra Ceia muck, Tomoka muck, and Floridana, Chobee, and Felda soils, flooded, are all very poorly drained soils that have a water table at or near the surface most of the time and are subject to flooding. These soils are not suited to pine trees, mainly because wetness is excessive. Coastal beaches occur as narrow strips along the Atlantic Ocean that are regularly covered by salt water at high tides or during storms. These areas are not suited to pine trees. The EauGallie, Felda, and Pineda sands, bedded, are used almost exclusively for citrus. They are suited to pine trees, but will probably always be used for high-value crops.

Quartzipsamments, smoothed, is sandy soil material that has been reworked and shaped by earthmoving equipment. These areas are most common near urban centers or along major highways and will probably be used for building sites, roadways, recreational areas, and related uses. Spoil banks consists of piles of soil material dug from ditches and canals on land dredged from the ship channel in the Indian River. Because the soil characteristics of both Quartzipsamments, smoothed, and Spoil banks are highly variable within short distances, these areas cannot be adequately rated for pine tree production. Swamp is very poorly drained and poorly drained, is commonly covered with water most of the

time, and consequently is not suited to pine trees. Tidal marsh and Tidal swamp are regularly covered with salt or brackish water at high tide and for this reason are not suited to pine trees.

The 14 woodland groups in the county are described in table 5. The average site index of slash, longleaf, sand, and pond pines are listed for each suitability group. Also shown are ratings of the hazards and limitations that affect management. The ratings in table 5 are based largely on the experience and judgment of local soil scientists, foresters, and landowners. Only pines are considered in table 5. Some soils in low areas and along streams are suited to hardwoods. Foresters should be consulted before extensive hardwood management is undertaken. The terms used in the table are explained in the following paragraphs.

The potential productivity of a soil for a specified kind of tree is expressed as a *site index*. The site index for a given soil is the height, in feet, that a specified kind of tree on that soil will reach in 50 years. The site index of a soil is determined mainly by the capacity of the soil to provide moisture and growing space for tree roots. A site index in table 5 is an average for all the soils in the suitability group. The site index for any one soil in the group may be slightly more or less than average.

Each woodland suitability group has, in varying degree, limitations that affect its management. In the descriptions of the suitability groups, some of these limitations are expressed in relative terms, *slight*, *moderate*, or *severe*. The relative term expresses the degree of limitation.

Seedling mortality.—Even when healthy seedlings of a suitable tree are correctly planted or occur naturally in adequate numbers, some of them do not survive if characteristics of the soil are unfavorable.

TABLE 5.—*Wood crops and factors in management*

Woodland group and map symbols	Potential productivity			Seedling mortality	Plant competition	Equipment limitation	Preferred species for planting
	Pine species	Site index	Average annual growth to age 30				
			Cords/acre				
Group 1: Excessively drained sandy soils that have a water table below a depth of 120 inches. Potential productivity is low. Pb, PfB, PfD, SfB, SfD.	Sand	50	0. 5–0. 9	Severe	Moderate	Severe	Sand.
Group 2: Excessively drained sandy soils that have a water table below a depth of 120 inches. Potential productivity is moderate. As.	Slash Longleaf	70 60	1. 0–1. 5 0. 8–1. 3	Moderate	Moderate	Moderate	Slash.
Group 3: Moderately well drained to somewhat poorly drained sandy soils that have a water table within a depth of 10 to 60 inches most of the time. Potential productivity is low. Ps, Sa.	Sand Slash	70 60	0. 7–1. 0 1. 0–1. 5	Severe	Moderate	Moderate	Slash.
Group 4: Well drained to moderately well drained sandy soils that have a water table within a depth of 20 to 60 inches or more. Potential productivity is moderate. Ca, Or, We.	Sand Slash	70 70	0. 7–1. 0 0. 8–1. 2	Severe	Moderate	Severe	Sand.
Group 5: Poorly drained sandy soils that have a water table within a depth of 40 inches or more. Potential productivity is moderate. Im, Mk.	Slash Longleaf	70 60	1. 0–1. 5 0. 5–0. 9	Moderate	Moderate	Moderate	Slash.
Group 6: Poorly drained sandy soils that have a water table within a depth of 40 inches most of the time. Potential productivity is moderate. Ba, Pw, Va.	Slash Longleaf	70 60	1. 0–1. 5 0. 5–0. 9	Moderate	Severe	Severe	Slash.
Group 7: Poorly drained sandy soils that are flooded for 6 months or more in most years. Potential productivity is moderate. Ew, Fg, Mp, Sc.	Slash Longleaf Pond	70 60 50	1. 0–1. 5 0. 4–0. 8 0. 6–1. 0	Severe	Severe	Severe	Slash.
Group 8: Moderately well drained sandy soils that have a water table below a depth of 40 inches. Potential productivity is moderately high. Ta.	Slash Longleaf	80 70	1. 3–1. 8 0. 8–1. 2	Moderate	Moderate	Moderate	Slash.

TABLE 5.—*Wood crops and factors in management*—Continued

Woodland group and map symbols	Potential productivity			Seedling mortality	Plant competition	Equipment limitation	Preferred species for planting
	Pine species	Site index	Average annual growth to age 30				
			Cords/acre				
Group 9: Well-drained sandy soils, underlain by bedrock at a depth of 20 to 54 inches, that have a water table estimated to be below a depth of 72 inches. Potential productivity is moderately high. Co.	Slash Longleaf	80 70	1. 0–1. 5 0. 6–1. 0	Moderate	Moderate	Moderate	Slash.
Group 10: Poorly drained sandy soils that have a water table within a depth of about 40 inches. Potential productivity is moderately high. Eg, Od, Sb, Wa.	Slash Longleaf	80 70	1. 3–1. 7 0. 5–1. 0	Moderate	Moderate	Moderate	Slash.
Group 11: Poorly drained sandy soils that have a water table within a depth of 40 inches most of the time. Potential productivity is moderately high. Fa, Fe, Ho, Ma, Mb, Pn, Pp.	Slash Longleaf	80 70	1. 2–1. 7 0. 8–1. 1	Severe	Severe	Moderate	Slash.
Group 12: Poorly drained to very poorly drained sandy soils that have a water table within a depth of 30 inches. Potential productivity is moderately high. Cp, Pk.	Slash Longleaf	80 70	0. 8–1. 2 0. 5–1. 0	Moderate	Severe	Severe	Slash.
Group 13: Poorly drained sandy soils that have a water table within a depth of about 30 inches. Potential productivity is high. Br, Wn.	Slash Longleaf	90 80	1. 3–1. 8 0. 9–1. 2	Moderate	Severe	Moderate	Slash.
Group 14: Very poorly drained sandy and loamy soils that have a water table within a depth of 40 inches most of the time. Potential productivity is high. An, Ch, Fn.	Slash Longleaf	90 80	1. 3–1. 8 0. 9–1. 2	Severe	Severe	Severe	Slash.

Mortality is *slight* if not more than 25 percent of the planted seedlings die, or if trees ordinarily regenerate naturally in places where there are enough seeds. Mortality is *moderate* if 25 to 50 percent of the seedlings die, or if trees do not regenerate naturally in numbers needed for adequate restocking. In some places replanting to fill open spaces is necessary. Mortality is *severe* if more than 50 percent of the planted seedlings die, or if trees do not ordinarily reseed naturally in places where there are enough seeds. If mortality is severe, seedlings should be planted where seeds do not grow and special seedbeds should be prepared. Good methods of planting are essential to insure a full stand of trees.

Plant competition.—When a woodland is disturbed by fire, cutting, grazing, or some other means, undesirable brush, trees, and plants invade. The invading growth competes with the desirable trees and hinders their establishment and growth.

Competition is *slight* if unwanted plants present no special problem. It is *moderate* if the invaders delay, but do not prevent the establishment of a normal, fully stocked stand. Where plant competition is moderate, seedbed preparation is generally not needed and simple methods can be used to prevent undesirable plants from invading. Competition is *severe* if trees cannot regenerate naturally. Where competition is severe, careful site preparation, controlled burning, spraying with chemicals, and girdling are essential.

Equipment limitation.—Drainage, slope, flooding, soil texture, or other soil characteristics can restrict or prohibit the use of ordinary equipment in pruning, thinning, harvesting, or other woodland management. Different soils require different kinds of equipment, methods of operation, or seasons when equipment can be used.

The limitation is *slight* if there are no restrictions on the type of equipment or on the time of year that the equipment can be used. It is *moderate* if slopes are moderately steep, if heavy equipment is restricted by wetness, or if the use of equipment damages the tree roots to some extent. Equipment limitation is *severe* if many types of equipment cannot be used, if the time equipment cannot be used is more than 3 months a year, and if the use of equipment severely damages the roots of trees and the structure and stability of the soil. The limitation is severe on moderately steep and steep soils and on very wet and very sandy soils.

Wildlife

Wildlife is a valuable resource of Brevard County. Because the county still has large undeveloped areas, a considerable wildlife population remains. Each species of wildlife inhabits several different soil areas in feeding, nesting, and seeking shelter. It can be assumed, therefore, that all soils of the county contribute to the support of one or more species of wildlife.

The principal game species are turkey, deer, bobwhite quail, mourning dove, gray squirrel, and wild ducks. Hunting of raccoons and wild hogs is done occasionally.

Wild turkeys and white-tailed deer are numerous in some parts of the county. Turkeys roost in the larger trees in the swamps and feed on various tree seeds and understory plants in small open areas. In open flatwoods they feed on palmetto and gallberries, grass seeds, and acorns of runner oak. In hammocks (fig. 12) they find cover and feed on cabbage palm fruits, pine seeds, and acorns. Deer find cover in hammocks or in palmetto clumps in or near swamps and feed on the leafy parts of many of the same plants that turkeys feed on. Many deer feed on improved pastures. The availability of water is very important to both species. Many areas where turkey and deer are numerous are closed to public hunting.

Bobwhite quail are common in the pasture lands and citrus groves of the county. Quail are ground nesting birds, and as areas are developed for residential use, their numbers decrease. Their population varies from year to year, depending on wetness in spring and early in summer. Quail eat seeds, fruit, green vegetation, and insects. Some of their choice foods are acorns, beggarweeds, partridge peas, myrtle, gallberries, cabbage palm fruit, and pine seeds. Their choice agricultural foods are clovers and other grass seeds. Water is not essential as quail can commonly obtain enough moisture from dew, succulent vegetation, and other moist foods. Small food plots planted near natural cover help to increase the quail population.

Mourning doves are both resident and migratory. They probably are the most adaptable of all wildlife species and have learned to live in close association with man, not only on farms, but also in the suburbs. They are equally at home in citrus groves, windbreaks, farm fields, suburban residential areas, hedgerows, and open woodland. They inhabit most of the same areas that quail do, but they are commonly found feeding in groves and pasture and on idle land. They have natural flyways

***Figure 12.*—Dense cabbage palm and live oak on Parkwood fine sand, moderately fine subsoil variant, provide cover and food for turkey and deer.**

between areas that provide food and water and sandy areas that provide grit. Their diet consists entirely of seeds. Native seeds most preferred are those of pine, holly, ragweed, and grasses. Mourning doves will not feed where vegetation is dense.

The small number of gray squirrels in Brevard County generally are in hammocks and swamps. They like areas where they can travel between the tree crowns. Squirrels adjust and adapt to populated areas, however, as long as there are plenty of hardwoods.

Raccoons are numerous throughout the county, especially in the more wooded and marshy areas. They feed on native berries, rodents, and shellfish and also on citrus.

Wild hogs inhabit the organic marsh in the southern part of the county and the surrounding pastures. They forage for roots, berries, grubs, and other succulent plants.

Thousands of wild ducks winter in Brevard County. Twenty-two species of ducks have been found. The Merritt Island National Wildlife Refuge in the northern part of the island provides good habitat. Thousands more find food in the Indian and Banana Rivers, the St. Johns River, and the many large ditches and canals in the county. The Florida duck, or mottled duck, finds sanctuary in the tangle of vegetation and sawgrass sloughs in the marshes of the St. Johns River. Thousands of acres of Tidal marsh within the national wildlife refuge have been diked and impounded with water to control mosquitos and to regulate waterfowl habitat (fig. 13).

Game fish are largely confined to the St. Johns River (fig. 14) and to Poinsett, Washington, Winder, Sawgrass, and Hellen Blazes Lakes.

Largemouth bass, bluegill bream, redear bream (shellcrackers), and channel catfish are the game fish most sought in the inland lakes and ponds. These fish are also most suitable for stocking manmade ponds. The St. Johns River system also provides many of the lesser known freshwater fish and the anadromous species of shad. Fishing for shad is popular from November into April.

The Indian and Banana Rivers offer many opportunities for the salt water sports fisherman. Brevard County is well known for sea trout, channel bass, drum, sheephead, snook, and blue crabs.

There are numerous nongame species of wildlife in the county. Rabbits and armadillos in fairly large numbers are in all areas. The number of armadillos, which are not native to the county, has increased to such an extent that they are considered pests.

***Figure 13.*—An area of Tidal marsh that has been diked to impound water for wildlife and mosquito control. The water level is controlled.**

Large, majestic sandhill cranes are frequently seen in twos and threes feeding in broad open flatwoods areas, shallow ponds, and drainage ditches. These birds nest over shallow ponds.

Cattle egrets, though not native, occur in great numbers and feed on insects alongside grazing cattle. They nest in swamp trees and thickets near ponds.

Alligators and bobcats are native to the county, but they are few and are seldom observed, except by those who know their haunts. Alligators inhabit swamps, marshes, and drainage ditches, and bobcats frequent swamps and other soil areas that are heavily wooded.

Wading birds, such as snowy egrets, white ibis, wood ibis, and little blue herons that frequent the wet marshy areas, have decreased in recent years. They nest in bushes or trees over water and feed on snails, small fish, frogs, and insects in ponded areas and sloughs. Many shore birds are along the coast in Tidal marsh, in open areas of Tidal swamp, and on Coastal beaches.

Many soil and water conservation practices help in managing the various areas of the county for wildlife and fish. Most important are brush and weed control, controlled burning, aquatic weed control, wildlife habitat development, and wildlife wetland development. The stocking and management of farm ponds and fish ponds are also important.

Wildlife management can be successful if food, cover, and water are available in suitable places. Wildlife habitat can be created, improved, or maintained by planting or managing existing vegetation on the soils to provide desirable plants. Table 6 rates the soils according to their suitability for producing the various wildlife habitat elements and for three general kinds of wildlife. The present land use, the relationship of soils to adjoining areas, and the movement of wildlife are not considered in these ratings. Ratings and column headings shown in table 6 are defined in the following paragraphs.

A rating of *well suited* means that habitat generally can be easily created, improved or maintained; few or no soil limitations affect management; and satisfactory results can be expected. A rating of *suited* means that a habitat can be created, improved, or maintained, but limitations are moderate. Moderately intensive management and fairly frequent attention are required for satisfactory results. A rating of *poorly suited* means that a habitat generally can be created, improved, or maintained, but soil limitations are severe. Management of the habitat is difficult and expensive and requires intensive effort. A rating of *not suited* means that a habitat cannot be created, improved, or maintained, or that these practices are not feasible under prevailing soil conditions.

Figure 14.—**Good fishing on the St. Johns River provides many hours of recreation for anglers. The river is bordered on both sides by Floridana, Chobee, and Felda soils, flooded.**

TABLE 6.—*Suitability of soils for elements*

Soil series and map symbols	Wildlife habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees and shrubs
Anclote: An	Not suited	Poorly suited	Poorly suited	Not suited [1]
Astatula: As, At	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Basinger: Ba	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Bradenton shallow variant: Br	Suited	Suited	Suited	Well suited
Canaveral: Ca, Cc	Poorly suited	Suited	Poorly suited	Suited
Canova: Cd	Poorly suited	Suited	Poorly suited	Not suited
Chobee: Ch	Poorly suited	Suited	Poorly suited	Suited [2]
Coastal beaches: Ck	Not suited	Not suited	Not suited	Not suited
Cocoa: Co	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Copeland: Cp	Poorly suited	Poorly suited	Suited	Suited
Eau Gallie:				
Eg	Poorly suited	Suited	Suited	Poorly suited
Eu	Poorly suited	Well suited	Suited	Poorly suited
Ew	Not suited	Not suited	Not suited	Not suited
Felda:				
Fa	Poorly suited	Suited	Suited	Poorly suited
Fd	Poorly suited	Well suited	Suited	Poorly suited
Fe	Poorly suited	Suited	Suited	Suited
Fg	Not suited	Not suited	Not suited	Not suited
Floridana:				
Fn	Poorly suited	Suited	Poorly suited	Suited
Fo	Not suited	Poorly suited	Suited	Not suited
Galveston: Ga	Poorly suited	Suited	Poorly suited	Poorly suited
Holopaw: Ho	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Immokalee: Im	Poorly suited	Suited	Suited	Poorly suited
Malabar: Ma, Mb	Poorly suited	Suited	Suited	Suited
Micco: Mc	Not suited	Not suited	Not suited	Not suited
Montverde: Me	Not suited	Not suited	Not suited	Not suited
Myakka:				
Mk	Poorly suited	Suited	Suited	Poorly suited
Mp	Not suited	Not suited	Not suited	Not suited
Mu	Poorly suited	Suited	Suited	Poorly suited
Oldsmar: Od	Poorly suited	Suited	Suited	Poorly suited
Orsino: Or	Poorly suited	Poorly suited	Poorly suited	Suited
Palm Beach: Pb	Not suited	Not suited	Poorly suited	Poorly suited
Paola: PfB, PfD, Ph	Poorly suited	Poorly suited	Poorly suited	Poorly suited

See footnotes at end of table.

of wildlife habitat and kinds of wildlife

Wildlife habitat elements—Continued			Kinds of wildlife		
Coniferous trees	Wetland food and cover plants	Shallow water developments	Openland wildlife	Woodland wildlife	Wetland wildlife
Not suited	Suited	Suited	Not suited	Not suited [1]	Suited.
Well suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Suited	Suited	Suited	Poorly suited	Poorly suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Poorly suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Not suited	Well suited	Well suited	Poorly suited	Not suited	Well suited.
Poorly suited	Suited	Well suited	Poorly suited	Poorly suited	Well suited.
Not suited	Not suited	Not suited	Not suited	Not suited	Not suited.
Poorly suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Poorly suited	Suited	Poorly suited	Poorly suited	Poorly suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Poorly suited	Poorly suited.
Suited	Not suited	Not suited	Suited	Poorly suited	Not suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Poorly suited	Suited	Suited	Suited	Poorly suited	Suited.
Suited	Not suited	Not suited	Well suited	Poorly suited	Not suited.
Poorly suited	Suited	Suited	Suited	Suited	Suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Poorly suited	Suited	Well suited	Poorly suited	Poorly suited	Well suited.
Not suited	Well suited	Well suited	Poorly suited	Not suited	Well suited.
Poorly suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Suited	Suited	Suited	Poorly suited	Poorly suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Poorly suited	Poorly suited.
Suited	Suited	Suited	Suited	Suited	Suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Suited	Poorly suited	Poorly suited	Suited	Poorly suited	Poorly suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Suited	Poorly suited	Poorly suited	Suited	Poorly suited	Poorly suited.
Suited	Poorly suited	Poorly suited	Suited	Poorly suited	Poorly suited.
Suited	Not suited	Not suited	Poorly suited	Suited	Not suited.
Poorly suited	Not suited	Not suited	Not suited	Poorly suited	Not suited.
Well suited	Not suited	Not suited	Poorly suited	Suited	Not suited.

TABLE 6.—*Suitability of soils for elements*

Soil series and map symbols	Wildlife habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees and shrubs
Parkwood moderately fine subsoil variant: Pk:	Poorly suited	Suited	Suited	Suited
Pineda:				
Pn	Poorly suited	Suited	Suited	Suited
Po	Poorly suited	Well suited	Suited	Poorly suited
Pineda dark surface variant: Pp	Poorly suited	Suited	Suited	Suited
Pomello: Ps, Pu	Not suited	Poorly suited	Poorly suited	Poorly suited
Pompano: Pw	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Quartzipsamments, smoothed: Qr	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Satellite: Sa	Poorly suited	Poorly suited	Poorly suited	Poorly suited
St. Johns:				
Sb	Poorly suited	Suited	Suited	Poorly suited
Sc	Not suited	Not suited	Not suited	Not suited
St. Lucie: SfB, SfD	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Spoil banks: Sp	Not suited	Not suited	Not suited	Not suited
Swamp: Sw	Not suited	Not suited	Not suited	Well suited
Tavares: Ta	Poorly suited	Suited	Suited	Suited
Terra Ceia: Tc	Not suited	Not suited	Not suited	Not suited
Tidal marsh: Tm	Not suited	Not suited	Not suited	Not suited
Tidal swamp: Ts	Not suited	Not suited	Not suited	Not suited
Tomoka: Tw	Not suited	Not suited	Not suited	Not suited
Urban land: Ur	Not suited	Not suited	Not suited	Not suited
Valkaria: Va	Poorly suited	Poorly suited	Suited	Suited
Wabasso: Wa	Poorly suited	Suited	Suited	Suited
Welaka: We	Poorly suited	Poorly suited	Poorly suited	Suited
Winder: Wn	Poorly suited	Suited	Suited	Poorly suited

[1] Areas under swamp vegetation are well suited.

of wildlife habitat and kinds of wildlife—Continued

Wildlife habitat elements—Continued			Kinds of wildlife		
Coniferous trees	Wetland food and cover plants	Shallow water developments	Openland wildlife	Woodland wildlife	Wetland wildlife
Suited	Suited	Suited	Suited	Suited	Suited.
Suited	Suited	Suited	Suited	Suited	Suited.
Suited	Not suited	Not suited	Well suited	Poorly suited	Not suited.
Suited	Suited	Suited	Suited	Suited	Suited.
Suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Suited	Suited	Suited	Poorly suited	Poorly suited	Suited.
Poorly suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Suited	Suited	Suited	Suited	Suited	Suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Suited	Not suited	Not suited	Poorly suited	Poorly suited	Not suited.
Not suited	Not suited	Not suited	Not suited	Not suited	Not suited.
Poorly suited	Suited	Suited	Not suited	Suited	Suited.
Suited	Not suited	Not suited	Suited	Suited	Not suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Not suited	Not suited	Not suited	Not suited	Not suited	Not suited.
Suited	Suited	Suited	Poorly suited	Suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Suited	Poorly suited.
Suited	Not suited	Not suited	Poorly suited	Suited	Not suited.
Poorly suited	Suited	Suited	Suited	Poorly suited	Suited.

[2] Areas under grass vegetation are poorly suited.

Grain and seed crops are domestic grains and seed-producing annual plants that have been planted to produce food for wildlife. Suitable plants are corn, sorghum, millet, soybeans, and partridge peas.

Grasses and legumes are domestic grasses and legumes that have been planted to produce food for wildlife and provide cover. Examples are bahiagrass, ryegrass, pangola grass, and clover.

Wild herbaceous plants are native or introduced perennial grasses, forbs, and weeds that provide food and cover for wildlife and that are established mainly through natural processes. Examples of these plants are beggarweed, pokeberry, quail bean, carpetgrass, and gallberries.

Hardwood trees and shrubs are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, or foliage (browse) used extensively as food by wildlife. These plants commonly become established through natural processes, but they may be planted. They include live oak, maple, hickory, cabbage palm, grape, honeysuckle, greenbrier, and blackberries.

Coniferous trees are cone-bearing trees and shrubs that are used mainly as cover, but also furnish some food in the form of browse, seeds, or berries. They become established through natural processes, or they may be planted. Examples are pines, cedars, and ornamentals. Saw-palmetto, runner oak, huckleberries, and gallberries are common in coniferous forests in Brevard County and are important sources of food and cover to wildlife.

Wetland food and cover plants are wild, annual and perennial, woody or herbaceous plants that grow in moist to wet areas. These plants furnish food or cover mostly for wetland wildlife. Examples are smartweed, wild millet, spikerush, button bush, wax myrtle, sawgrass, and other rushes and sedges.

Shallow water developments are areas where low dikes and water control structures are established to create a habitat mainly for waterfowl. In places they are designed so that they can be drained, planted, and flooded, and in other places they are designed to be used as permanent impoundments to grow submerged aquatics. Both freshwater and brackish water are considered.

The three general kinds of wildlife are described in the following paragraphs.

Openland wildlife are birds and mammals that normally frequent cropland, pastures, groves, and areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, doves, cottontail rabbits, meadowlarks, and cattle egrets.

Woodland wildlife are birds and mammals that normally frequent areas of hardwood trees and shrubs, cabbage palms and shrubs, coniferous trees and saw-palmetto, or a mixture of these plants. Examples are white-tailed deer, wild turkeys, gray squirrels, fox squirrels, and raccoons.

Wetland wildlife are birds and mammals that normally frequent wet areas, such as ponds, streams, ditches, marshes, and swamps. Examples are ducks, geese, shorebirds, snipe, and herons.

Town and Country Planning

The population of Brevard County has increased greatly in the past few years, largely as a result of the space program at the Kennedy Space Center on Merritt Island and the Cape Kennedy Air Force Station on Canaveral Peninsula. As the population of the county increases, greater demands are made for schools, churches, shopping centers, and associated facilities. As cities enlarge, serious problems of land use, pollution, and recreation frequently develop in and around these urban areas.

From early settlement until recent times the locations of towns, rural homes, citrus groves, cattle ranches, and highways have followed soil patterns that imposed the least restrictions. The rapid expansion of population in the area is forcing these land uses onto less desirable sites. As this happens, greater effort is needed to overcome the greater limitations. Sound land-use planning provides a logical base for the rapid change that was a function of natural selection when land was plentiful and people were few. It considers the physical limitations and hazards of an area and makes adequate provisions to overcome them. It considers both the onsite problems of the specific soil and the interrelationship between soils of entire land areas.

While many factors other than soils are important in planning for orderly development, soil quality is a basic and continuing factor. It demands full consideration, not only as a guide in determining use, but also as a measure of the kind and magnitude of problems that must be overcome for specific uses. While it may not be practicable to put all soils to their highest possible use, full knowledge of the problems that must be solved permits deliberate adjustment in use.

Farmers have long recognized the importance of selecting crops suited to the soils. They also know that management practices are strongly affected by soil conditions. Similar interpretations can be applied to soils information for use in town and country planning. Soil qualities are equally important in planning for industrial, recreational, residential, and related urban uses. The same soil characteristics and qualities that affect the kinds of crops and farming practices are also significant to nonfarm uses. The decisions on urban uses, however, are not necessarily determined on basis of suitability. Instead, the physical characteristics and qualities of the soil become paramount, and interpretations are more directly concerned with the limitations, restrictions, or hazards imposed by soil conditions if the soil is used for a particular purpose.

Good land use planning requires early consideration of these soil limitations, restrictions, or hazards and suggests corrective practices needed to prevent serious mistakes—only some of which can be corrected later.

This section presents some of the basic facts about the soils in Brevard County and their relationship to sound planning for the orderly development of the area.

Proper use of soils information in land-use planning logically should follow three fundamental steps:

Step 1: An overall study of general soil conditions within a large area.

Step 2: A careful study of the individual soils as classified and mapped in a detailed soil survey.

Step 3: An onsite study. After planning has progressed to the point of applying specific uses to an area,

specific onsite investigations are necessary. Even detailed soil surveys have inclusions of other soils in mapping units. These inclusions may have soil characteristics that would adversely affect foundations, drain fields, roadbeds, and other uses.

Interpretations of soil information made in this guide are for use in Steps 1 and 2. Step 1 can be accomplished by applying information in table 7 to the general soil map that accompanies this survey. Step 2 requires application of information in table 7 to the detailed soil survey.

In Brevard County soils are rated in terms of limitations, restrictions, or hazards for many uses by considering properties of the soils significant to the rating. These properties can be observed in the field or measured in the laboratory. Some are basic soil characteristics, such as slope and available water capacity. Others are soil qualities that are the manifestation of interactions between basic soil characteristics. Permeability, for example, is a soil quality that is the manifestation of soil texture, structure, and density.

Some soil properties, such as slope and wetness, affect practically all uses to an important degree. Others, such as corrosion potential, are of considerable importance to only one of the specified uses—and then only under certain conditions. Some have an abstract value that may be altered when considered in relationship to other characteristics. The relative importance of any particular soil quality varies from one use to another; the slope of the land has a very important bearing on septic tanks but is of very limited importance to wildlife uses.

Space requirements of a growing population create competition for the use of land. Many factors influence decision on the best use. Without consideration of the underlying causes, development may follow reasonably well defined intensity patterns that involve change from low-intensity use to a higher intensity use. Generally, intensity in use ascends from forest to improved pasture, to cultivation, to suburban residential, and then to urban residential and industrial. Some soils can easily support this entire sequence of uses. Others, however, have limitations that seriously restrict them for one or more of these uses. Some soils may have very low capability for woodland, range, or cultivated crops and yet have only minor limitations for industrial uses. St. Lucie soils exemplify this. On the other hand, such soils as Montverde peat have high potential for some cultivated crops, and yet they are poorly suited to woodland or have very severe restrictions for residential use. A few soils have such extreme limitations that they would have to be greatly altered before they could be used for a desired purpose.

Under the pressures of urban expansion, changes in land use have been progressively toward the more intensive uses. Although economics, relative location, and other factors are involved, soil quality has a basic influence that cannot be ignored without creating difficult problems. Changes in land use made without considering soils and their capability endanger irreplaceable cropland. Not only is the highest or best practicable use involved, but also the number or choice of alternatives as well. Enlightened decisions regarding proper use can be made only by considering basic information about soils.

Limitations, restrictions, and hazards to a number of important uses of the soils in town and country planning are considered in this section. Table 7 shows the soil limitations, restrictions, and hazards in building construction, landscaping, sanitation, transportation, recreation, and other uses. It also describes the chief limiting properties of the soils.

Soil limitations are rated as slight, moderate, severe, and very severe. *Slight* means that soil properties generally are favorable for the rated use or that limitations are minor and easily overcome or are modified by special planning and design. *Moderate* means that soil properties are moderately favorable for a particular use. Limitations can be overcome or modified by planning, design, or by special maintenance. *Severe* indicates soil properties so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance is required. *Very severe* means that one or more soil properties are so unfavorable for a particular use that overcoming the limitations is difficult and costly.

The degree of limitation shown in table 7 is based on all soil characteristics considered pertinent, but only the most limiting soil characteristics are stated. Column headings in the table are defined in the following paragraphs.

Dwellings, as rated in table 7, are no more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Lawns and ornamental plants and suitability of the soil are important considerations in landscaping homesites and many suburban business establishments and are significant in highway beautification and most recreational developments. Qualities of soils that most affect landscaping are available water capacity, depth to the water table, productivity, effective root depth, and susceptibility to flooding.

Septic tank absorption fields, a common means of sewage disposal, are used for homes in rural sections and in some subdivisions where rapidly expanding residential areas have outgrown existing sewer lines or where sewer lines do not exist. These systems, to function properly, must be installed on soils that have an adequate absorptive capacity and that are not affected by a high water table. Many soils that are poorly drained are highly permeable and absorb water rapidly if drained, but a normally high water table severely limits their use as septic tank absorption fields. Septic tank absorption fields may function well on these soils in dry seasons. Soil properties that most affect the use of soils as septic tank absorption fields are wetness, permeability, and the hazard of flooding.

TABLE 7.—*Degree and kind of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Dwellings	Lawns and ornamental plants	Septic tank absorption fields	Local roads and streets
Anclote: An	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
*Astatula: As, At. For Urban land part of At, see Urban land.	Slight	Moderate: low available water capacity; low natural fertility.	Slight [1]	Slight
Basinger: Ba	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Bradenton shallow variant: Br	Severe: high water table.	Moderate: high water table.	Severe: high water table; rock above a depth of 40 inches.	Severe: high water table.
*Canaveral: Ca, Cc. For Urban land part of Cc, see Urban land.	Moderate: moderately high water table.	Severe: very low available water capacity; low natural fertility.	Moderate: [1] moderately high water table.	Moderate: moderately high water table.
Canova: Cd	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard; low traffic-supporting capacity.
Chobee: Ch	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Coastal beaches: Ck	Very severe: high water table; flood hazard.	Very severe: low natural fertility; high salinity.	Very severe: high water table; flood hazard.	Variable
Cocoa: Co	Moderate: rock within a depth of 20 to 54 inches.	Slight	Severe: [1] rock within a depth of 20 to 54 inches.	Slight to moderate: rock within a depth of 20 to 54 inches.
Copeland: Cp	Severe: high water table; flood hazard.	Moderate: high water table; moderately shallow effective root depth.	Severe: high water table; rock above a depth of 40 inches; flood hazard.	Severe: high water table; flood hazard.
*Eau Gallie:				
Eg	Severe: high water table.	Moderate: low available water capacity; low natural fertility.	Severe: high water table.	Severe: high water table.
Eu	Severe: moderately high water table.	Slight	Severe: moderately high water table.	Moderate: moderately high water table.
Ew. For Felda part of Ew, see Felda series. For Winder part of Ew, see Winder series.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

See footnote at end of table.

limitation for selected uses

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: loose sand	Severe: loose sand	Moderate: loose sand; low natural fertility.	Severe: loose sand	Slight	Slight.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; rock above a depth of 40 inches.	Severe: high water table; rock above a depth of 40 inches.
Severe: loose sand	Severe: loose sand	Severe: loose sand; low natural fertility.	Severe: loose sand	Moderate: moderately high water table.	Moderate: moderately high water table.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Variable	Very severe: high water table; flood hazard; loose sand.	Very severe: high water table; flood hazard; high salinity.	Variable	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Moderate: loose sand.	Moderate: loose sand.	Moderate: loose sand; low natural fertility.	Moderate: loose sand.	Severe: rock within a depth of 54 inches.	Severe: rock within a depth of 54 inches.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; rock above a depth of 40 inches; flood hazard.	Severe: high water table; rock above a depth of 40 inches; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: moderately high water table. Severe: high water table; flood hazard.	Moderate: moderately high water table. Severe: high water table; flood hazard.	Moderate: moderately high water table. Severe: high water table; flood hazard.	Moderate: moderately high water table. Severe: high water table; flood hazard.	Severe: moderately high water table. Severe: high water table; flood hazard.	Severe: moderately high water table. Severe: high water table; flood hazard.

TABLE 7.—*Degree and kind of*

Soil series and map symbols	Dwellings	Lawns and ornamental plants	Septic tank absorption fields	Local roads and streets
*Felda:				
Fa, Fe	Severe: high water table; flood hazard.	Moderate: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Fd	Severe: moderately high water table.	Slight	Severe: moderately high water table.	Moderate: moderately high water table.
Fg For Winder part of Fe and Fg, see Winder series.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
*Floridana:				
Fn	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Fo For Chobee part of Fo, see Chobee series. For Felda part of Fo, see Felda series.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
*Galveston: Ga For Urban land part of Ga, see Urban land.	Slight	Severe: very low available water capacity; low natural fertility.	Moderate:[1] moderately high water table.	Slight
Holopaw: Ho	Severe: high water table; flood hazard.	Severe: high water table; very low available water capacity.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Immokalee: Im	Severe: high water table.	Moderate: very low available water capacity; low natural fertility	Severe: high water table.	Severe: high water table.
*Malabar:				
Ma	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Mb For Holopaw part of Mb, see Holopaw series. For Pineda part of Mb, see Pineda series.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Micco: Mc	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; very low traffic-supporting capacity.
Montverde: Me	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; very low traffic-supporting capacity.
*Myakka:				
Mk, Mu For Urban land part of Mu, see Urban land.	Severe: high water table.	Moderate: high water table; low natural fertility.	Severe: high water table.	Severe: high water table.
Mp	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

See footnote at end of table.

limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: high water table; flood hazard. Moderate: moderately high water table. Severe: high water table; flood hazard.	Severe: high water table; flood hazard. Moderate: moderately high water table. Severe: high water table; flood hazard.	Severe: high water table; flood hazard. Moderate: moderately high water table. Severe: high water table; flood hazard.	Severe: high water table; flood hazard. Moderate: moderately high water table. Severe: high water table; flood hazard.	Severe: high water table; flood hazard. Severe: moderately high water table. Severe: high water table; flood hazard.	Severe: high water table; flood hazard. Severe: moderately high water table. Severe: high water table; flood hazard.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: loose sand.	Severe: loose sand.	Severe: low natural fertility; loose sand.	Severe: loose sand.	Moderate: moderately high water table.	Moderate: moderately high water table; low natural fertility.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table	Severe: high water table.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

TABLE 7.—*Degree and kind of*

Soil series and map symbols	Dwellings	Lawns and ornamental plants	Septic tank absorption fields	Local roads and streets
Oldsmar: Od	Severe: high water table.	Moderate: high water table; very low available water capacity; low natural fertility.	Severe: high water table.	Severe: high water table.
Orsino: Or	Slight	Severe: very low available water capacity; low natural fertility.	Moderate:[1] moderately high water table.	Slight
Palm Beach: Pb	Slight	Severe: very low available water capacity; low natural fertility.	Slight[1]	Slight
*Paola:				
PfB, Ph. For Urban land part of Ph, see Urban land.	Slight	Severe: very low available water capacity; low natural fertility.	Slight[1]	Slight
PfD	Moderate: slope	Severe: very low available water capacity; low natural fertility.	Moderate:[1] slope	Slight to moderate: slope.
Parkwood moderately fine subsoil variant: Pk.	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Pineda and Pineda dark surface variant:				
Pn, Pp	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Po	Severe: moderately high water table.	Slight	Severe: moderately high water table.	Moderate: moderately high water table.
*Pomello: Ps, Pu. For Urban land part of Pu, see Urban land.	Moderate: moderately high water table.	Severe: very low available water capacity; low natural fertility.	Moderate:[1] moderately high water table.	Slight
Pompano: Pw	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Quartzipsamments, smoothed: Qr	Variable: sandy material.	Variable: sandy material.	Variable: sandy material.	Variable: sandy material.
Satellite: Sa	Severe: high water table.	Moderate: very low available water capacity; low natural fertility.	Severe: high water table.	Moderate: high water table.
St. Johns:				
Sb	Severe: high water table.	Moderate: high water table.	Severe: high water table.	Severe: high water table.
Sc	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

See footnote at end of table.

limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: loose sand.	Severe: loose sand.	Severe: low natural fertility; loose sand.	Severe: loose sand.	Moderate: moderately high water table.	Moderate: moderately high water table; low natural fertility.
Severe: loose sand.	Severe: loose sand.	Severe: low natural fertility; loose sand.	Severe: loose sand.	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand	Severe: loose sand; low natural fertility.	Severe: low natural fertility; loose sand.	Severe: loose sand	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand	Severe: loose sand; slope.	Severe: low natural fertility; loose sand.	Severe: loose sand	Moderate: slope	Moderate: very low available water capacity; low natural fertility.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Severe: moderately high water table.	Severe: moderately high water table.
Severe: loose sand	Severe: loose sand	Severe: loose sand; low natural fertility.	Severe: loose sand	Moderate: moderately high water table.	Moderate: moderately high water table; low natural fertility.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Variable: sandy material.	Variable: sandy material.	Variable: sandy material.	Variable: sandy material.	Variable: sandy material.	Variable: sandy material.
Severe: high water table; loose sand.	Severe: high water table; loose sand.	Severe: high water table; low natural fertility.	Severe: high water table; loose sand.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

TABLE 7.—*Degree and kind of*

Soil series and map symbols	Dwellings	Lawns and ornamental plants	Septic tank absorption fields	Local roads and streets
St. Lucie:				
SfB	Slight	Severe: very low available water capacity; low natural fertility.	Slight [1]	Slight.
SfD	Moderate: slope	Severe: very low available water capacity; low natural fertility.	Moderate:[1] slope	Slight.
Spoil banks: Sp	Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.
Swamp: Sw	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; low traffic-supporting capacity.
Tavares: Ta	Slight	Moderate: low available water capacity; low natural fertility.	Moderate:[1] moderately high water table.	Slight.
Terra Ceia: Tc	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; low traffic-supporting capacity.
Tidal marsh: Tm	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; low traffic-supporting capacity.
Tidal swamp: Ts	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard;	Very severe: high water table; flood hazard; low traffic-supporting capacity.
Tomoka: Tw	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard; low traffic-supporting capacity.
Urban land: Ur, Present land use precludes other uses.				
Valkaria: Va	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Wabasso: Wa	Severe: high water table.	Moderate: high water table; low natural fertility.	Severe: high water table.	Severe: high water table.
Welaka: We	Slight	Severe: very low available water capacity; low natural fertility.	Moderate:[1] moderately high water table.	Slight.
Winder: Wn	Severe: high water table; flood hazard.	Moderate: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

[1] Very rapid or rapid permeability in places results in inadequate filtration and contamination of water supplies.

limitation for selected uses—Continued

Campsites and picnic areas	Playgrounds	Golf courses	Paths and trails	Basements and below-ground fallout shelters	Cemeteries
Severe: loose sand	Severe: loose sand	Severe loose sand; low natural fertility.	Severe: loose sand	Slight	Moderate: very low available water capacity; low natural fertility.
Severe: loose sand	Severe: loose sand; slope.	Severe: loose sand; low natural fertility.	Severe: loose sand	Moderate: slope	Moderate: very low available water capacity; low natural fertility.
Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.	Variable: mixed soil material.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Moderate: loose sand.	Moderate: loose sand.	Moderate: loose sand; low natural fertility.	Moderate: loose sand.	Moderate: moderately high water table.	Moderate: moderately high water table.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.	Very severe: high water table; flood hazard.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Sever high water table.	Severe: high water table.
Severe: loose sand	Severe: loose sand	Severe: low natural fertility; loose sand.	Severe: loose sand	Moderate: moderately high water table.	Moderate: moderately high water table; low natural fertility.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.

Local roads and streets, as rated in table 7, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have the ordinary provision for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Campsites and picnic areas normally require only small areas suitable for camping equipment and outdoor living and for outings during which a meal is eaten. Limitations related to sewage disposal facilities and service buildings used in camp areas are described under previously listed columns. The selection of campsites and picnic areas generally is limited or moderated by other than soil qualities because campers and picknickers prefer sites that provide beautiful scenery, hunting, fishing, or swimming. Such sites must be accessible and provide at least the minimum conveniences. The accessibility and desirability of campsites and picnic areas are greatly influenced by such soil properties as wetness, flood hazard, and trafficability.

Playgrounds are city parks, football and baseball fields, and other small areas where competitive sports are played outdoors. They should be nearly level, free from flood hazard or excessive wetness, easy to walk on, and suitable for landscaping. Wetness and flood hazards are the soil properties that have the greatest effect on the use of soils for playgrounds, but trafficability and productivity are also important.

Golf courses can be established where the soils vary widely if the site has a good balance between fairways and rough areas or hazards. The ratings in table 7 are based on the limitations of the soils for fairways. A fairway requires moderately well drained, gently sloping soils and a good cover of grass. People must be able to move freely over the fairway on foot or in a golf cart or other light motor vehicle. The main quantities that limit the use of soils for golf course fairways are susceptibility to flooding, depth to water table, productivity, trafficability, and slope.

Paths and trails are designed to permit hiking through areas of natural or artificial beauty. In addition to hiking, paths and trails facilitate such associated activities as nature study, hunting, and fishing. They should be easily traversable by foot and free from flood hazard or excessive wetness. Depth to water table, soil texture, flood hazard, and slope are soil properties that mainly affect the use of soils for paths and trails.

Basements and below-ground fallout shelters require well-drained soils that are free of ground water within 6 feet of the surface throughout the year and are not subject to flooding. The main properties considered are depth to water table, flood hazard, depth to bedrock, and slope.

Cemeteries require well-drained soils that are capable of growing lawn grasses and ornamental plants. The soils should be free of a ground water table within 6 feet of the surface throughout the year. On soils wetter than this, sites should be selected carefully to assure that adequate artificial drainage can be provided. Soil properties that limit the use of soils for cemeteries are wetness, flood hazard, and productivity. Depth to rock is of significance only if it occurs within a depth of 6 feet.

Soils and Engineering [4]

This section contains information that can be useful to agricultural and civil engineers and others interested in town and country planning. It discusses the use of the soil as a foundation material upon which structures rest or as a structural material.

To the engineer, soil is a natural material having engineering properties that vary widely from place to place, even within the boundaries of a single project.

Generally, the soil is used in the condition in which it is found. A large part of soil engineering, however, involves selecting the best possible soil, or soils, for each construction project. In doing so, engineers determine the engineering properties of the soils at a proposed site and correlate them with the construction requirements.

Among the properties most important to engineers are permeability, available water capacity, drainage, soil reaction, grain-size distribution, compaction characteristics, shrink-swell potential, plasticity, and shear strength.

The information in this survey can be used to—

1. Make soil and land-use studies that will aid in selecting and developing industrial, commercial, residential, and recreational sites.
2. Plan the construction of drainage and irrigation systems, farm ponds, diversions, and other soil and water conservation structures.
3. Make preliminary evaluations of soils in selecting locations for highways, airports, pipelines, cables, and buildings, and in planning more detailed investigations at the selected location.
4. Locate sources of sand, topsoil, and other construction material.
5. Correlate performance of engineering structures with soil mapping units and thus develop information that will be useful in designing and maintaining structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement other publications, such as maps, reports, and aerial photographs, that are used to prepare engineering reports for a specific area.

The engineering interpretations reported here can be used for many purposes. It should be emphasized, however, that these interpretations do not eliminate the need for sampling and testing at the site of specific engineering works. The soil map is useful for planning more detailed field investigations and for suggesting the kind of problems that may be expected.

Some of the terms used by soil scientists have a special meaning in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

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[4] BISHOP C. BEVILLE, area engineer, Soil Conservation Service, and WILLIAM A. WISNER, JR., geologist, Division of Materials and Tests, Florida Department of Transportation, helped prepare this section.

Engineering classification systems

Two systems of soil classification are in general use by engineers: They are the system adopted by the American Association of State Highway Officials (AASHO) (*1*), and the Unified system (*13*) developed by the Waterways Experiment Station, Corps of Engineers, and now used by the U.S. Department of Defense and by the Soil Conservation Service.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, all soil material is classified in 7 principal groups. The groups range from A–1, which consists of soils that have the highest bearing strength and are the best soils for subgrade, to A–7, which consists of soils that have the lowest strength when wet and are the poorest soils for subgrade. Within each group the relative engineering value of a soil material is indicated by a group index number given in parentheses. The numbers range from 0, for the best material, to 20, for the poorest. The group index number is shown in parentheses following the soil group symbol.

In the Unified system, soils are classified as coarse grain, fine grain, or organic according to particle-size distribution, plasticity, liquid limit, and organic-matter content.

There are 8 classes of coarse-grain soils. Each class consists of soils in which more than half the particles are larger than 0.074 millimeter. Symbols for these classes are G for gravel and S for sand combined with W for well graded, P for poorly graded, M for silty, or C for clayey.

There are 6 classes of fine-grain soils. More than half the particles in these soils are smaller than 0.074 millimeter. These classes are designated M for silts, C for clays, and O for organic soils, combined with L for low liquid limit or H for high liquid limit.

Highly organic, or peaty, soils are designated by the symbol Pt.

Soil scientists use the USDA textural classification (*11*). In this classification system, the texture of the soil is determined by the proportion of soil particles smaller than 2 millimeters in diameter; that is, the proportion of sand, silt, and clay. Textural modifiers, such as gravelly, stony, shaly, and cobbly, are used as needed.

Table 8 shows the AASHO and Unified classification of specified soils in the county, as determined by laboratory tests. Table 9 shows the estimated classification of all the soils in the county according to all 3 systems of classification.

Engineering test data

To help evaluate soils for structural purposes and to provide checks on estimated soil properties, samples from representative soils were tested according to standard AASHO procedures. The data given in table 8 are the results of tests made by the Florida State Department of Transportation.

The samples tested were obtained from depths of less than 10 feet. The test data, consequently, should not be used in estimating the characteristics of soil material at lower depths. Tests were made to determine moisture-density relations, grain-size distribution, liquid limit, and plasticity index. According to results of the tests, the soils were assigned ratings in the AASHO classification system and the Unified system. In the AASHO system, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material in the soil sample, including that coarser than 2 millimeters in diameter. The Soil Conservation Service uses the pipette method and excludes material coarser than 2 millimeters in diameter from the calculation. Percentages of clay obtained by the hydrometer method are not used in naming soil textural classes.

The moisture-density data are obtained by mechanical compaction. If a soil material is compacted at a progressively higher moisture content and the compaction effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After the optimum moisture content is reached, the density of the material decreases with an increase in moisture content. The data obtained from this test are important in earthwork because, as a rule, the maximum density obtained through this test represents a soil density that will insure the degree of stability required for most engineering purposes. The optimum moisture content represents the placement moisture content at which the desired density could be obtained with the least amount of compactive effort.

The liquid limit and plastic limit tests measure water content at these consistency limits in percent dry weight of the soil. They provide a means of determining the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Soil properties significant in engineering

Estimates of soil properties significant in engineering are shown in table 9. These estimates are made for typical soil profiles, by layers sufficiently different to have a different significance for soil engineering. They are based on field observation in mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Explanations of some of the columns in table 9 are given in the following paragraphs.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Flood hazard refers to water standing or flowing above the surface of the soil under natural conditions without artificial drainage. The frequency and duration of the flood hazard are shown in table 9.

TABLE 8.—*Engineering*

[Tests performed by the Florida State Department of Transportation (FDOT) in cooperation with the U.S. Bureau of Public

Soil name and location	Parent material	FDOT report number	Depth	Moisture density [1] Maximum dry density	Moisture density [1] Optimum moisture content
			In.	*Lb./cu. ft.*	*Pct.*
Anclote sand: About 150 feet southwest of the crossroads of two poor motor roads, SW¼NE¼ sec. 5, T. 24 S., R. 35 E.	Sandy marine sediments.	17 18	10–19 19–62	98. 3 101. 3	17. 5 15. 2
Astatula fine sand, dark surface: About 1 mile west of State Road No. 3, SW¼NE¼ sec. 22, T. 24 S., R. 36 E.	Marine or eolian sediments.	37 38	5–14 14–120	98. 5 99. 2	16. 4 17. 7
Basinger sand: About 1.75 miles west of U.S. Highway No. 1 on the road leading to Canaveral Grove Estates and about 100 yards south of a poor motor road, NE¼NE¼ sec. 2, T. 24 S., R. 35 E.	Sandy marine sediments.	29 30	27–40 40–80	111. 1 108. 3	11. 5 12. 4
Bradenton fine sand, shallow variant: About 1.5 miles southeast of Mims and about 150 feet east of a poor motor road, NE¼NW¼ sec. 21, T. 21 S., R. 35 E.	Sandy and loamy marine sediments over limestone.	43 44 45	7–12 15–18 18–34	98. 1 107. 5 107. 4	16. 5 16. 7 14. 8
Eau Gallie sand: About 1.25 miles south of the Duda Ranch office and about 5.5 miles west, SW¼SE¼ sec. 36, T. 25 S., R. 35 E.	Unconsolidated sandy and loamy marine sediments.	87 88 89	13–22 31–36 54–62	101. 1 102. 6 110. 8	14. 2 14. 9 12. 1
Felda sand: About 0.6 mile south of Lake Washington Road and 0.75 mile east of Lake Washington, NE¼NE¼ sec. 16, T. 27 S., R. 36 E.	Stratified marine sands and loamy materials.	24 25	0–28 33–59	106. 0 113. 3	13. 2 13. 3
Floridana sand: About 1 mile north of State Road No. 50 and about 1.75 miles west of the junction of Interstate Highway No. 95 and State Road No. 50, NW¼SW¼ sec. 24, T. 22 S., R. 34 E.	Sandy and loamy marine sediments.	54 55 56	12–29 29–38 43–62	105. 7 115. 2 118. 1	13. 8 12. 5 12. 8
Holopaw sand: About 30 feet west of a poor motor road and about 3.5 miles north of State Highway No. 520, NW¼NW¼ sec. 9, T. 24 S., R. 35 E.	Stratified sandy and loamy marine materials.	107 108	18–35 45–58	102. 1 110. 4	15. 2 7. 8
Immokalee sand: About 100 feet west of a poor motor road and about 0.9 mile west of the Florida East Coast Railroad, SW¼SW¼ sec. 25, T. 23 S., R. 36 E.	Beds of marine sands.	68 69	15–33 33–41	96. 5 92. 2	17. 2 17. 5
Myakka sand: About 100 yards southwest of a poor motor subdivision road and about 1 mile east of Interstate Highway No. 95 and the Eau Gallie Interchange, NE¼NE¼ sec. 23, T. 27 S., R. 36 E.	Beds of marine sands.	78 79 80	12–22 22–28 57–63	100. 6 92. 0 109. 7	14. 2 10. 0 12. 4
Orsino fine sand: About 200 feet northwest of the junction of U.S. Highway No. 1 and State Road No. 5A, NE¼SE¼ sec. 2, T. 20 S., R. 34 E.	Deep beds of sandy marine or eolian sand.	99 100 101	7–16 28–37 69–81	100. 3 103. 3 102. 1	15. 8 14. 4 15. 2
Paola fine sand, 0 to 5 percent slopes: About 25 feet west of a good motor road and about 0.7 mile south of State Road No. 46, NE¼SE¼ sec. 24, T. 21 S., R. 34 E.	Thick beds of eolian sand.	4 5 6	5–24 24–48 60–90	99. 3 102. 0 105. 0	16. 5 15. 5 15. 4

See footnotes at end of table.

test data

Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechaicanl analysis [2]								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—							
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [3]	Unified [4]
								Pct.			
100	100	92	5	5	4	2	1	----------	[5] NP	A-3(0)	SP-SM
100	100	88	4	4	3	3	2	----------	NP	A-3(0)	SP
100	100	100	5	5	4	4	3	----------	NP	A-3(0)	SP-SM
100	100	100	4	4	3	3	2	----------	NP	A-3(0)	SP
100	100	83	8	8	7	6	6	----------	NP	A-3(0)	SP-SM
100	100	84	6	6	5	4	4	----------	NP	A-3(0)	SP-SM
100	100	99	4	4	3	2	1	----------	NP	A-3(0)	SP
100	94	89	28	26	22	20	19	32	15	A-2-6(1)	SC
100	96	86	22	20	13	12	9	----------	NP	A-2-4(0)	SM
100	100	92	3	2	1	1	0	----------	NP	A-3(0)	SP
100	100	92	10	9	6	6	5	----------	NP	A-3(0)	SP-SM
100	100	94	14	14	13	12	12	----------	NP	A-2-4(0)	SM
100	100	85	5	4	4	4	1	----------	NP	A-3(0)	SP-SM
100	100	87	21	21	20	20	19	27	12	A-2-6(0)	SC
100	100	88	7	6	6	2	2	----------	NP	A-3(0)	SP-SM
100	100	89	26	25	24	22	21	27	14	A-2-6(0)	SC
100	100	86	22	22	20	18	17	24	11	A-2-6(0)	SC
100	100	89	4	4	2	2	2	----------	NP	A-3(0)	SP
100	100	89	16	16	14	13	13	----------	NP	A-2-4(0)	SM
100	100	94	2	2	1	1	0	----------	NP	A-3(0)	SP
100	100	96	9	8	5	5	4	----------	NP	A-3(0)	SP-SM
100	100	90	4	4	2	1	1	----------	NP	A-3(0)	SP
100	100	89	19	16	13	10	7	----------	NP	A-2-4(0)	SM
100	100	86	10	9	8	8	8	----------	NP	A-3(0)	SP-SM
100	100	93	2	2	1	1	1	----------	NP	A-3(0)	SP
100	100	93	4	4	3	3	2	----------	NP	A-3(0)	SP
100	100	92	2	2	2	2	1	----------	NP	A-3(0)	SP
100	100	85	2	2	2	0	0	----------	NP	A-3(0)	SP
100	100	86	3	3	3	1	1	----------	NP	A-3(0)	SP
100	100	80	3	3	2	1	1	----------	NP	A-3(0)	SP

TABLE 8.—*Engineering*

Soil name and location	Parent material	FDOT report number	Depth	Moisture density [1]	
				Maximum dry density	Optimum moisture content
			In.	*Lb./cu. ft.*	*Pct.*
Pineda sand: About 0.75 mile south of State Road No. 500, NE¼NE¼ sec. 9, T. 28 S., R. 36 E.	Sandy and loamy marine materials.	31	13–19	104. 1	15. 2
		32	23–33	106. 6	13. 4
		33	33–47	115. 0	12. 7
Pomello sand: About 0.4 mile east of Satellite Boulevard, NE¼SE¼ sec. 8, T. 24 S., R. 35 E.	Thick beds of marine sand.	65	3–27	98. 0	16. 9
		66	50–57	99. 7	15. 8
		67	62–70	107. 7	13. 7
Pompano sand: South of Rockledge on the Duda Ranch about 0.25 mile east of farm road, 135 feet south of canal and 70 feet west of fence, SW¼SE¼ sec. 8, T. 26 S., R. 36 E.	Thick beds of marine sand.	109	22–30	106. 8	11. 5
		110	50–65	112. 9	11. 9
St. Lucie fine sand, 0 to 5 percent slopes: About 75 feet east of Clear Lake Road, NW¼NW¼ sec. 20, T. 24 S., R. 36 E.	Thick beds of marine or eolian sand.	42	3–120	96. 9	11. 7
Tavares fine sand: About 2.0 miles south of St. Lukes Episcopal Church and about 200 yards east of the citrus grove headquarters, NW¼SE¼ sec. 3, T. 24 S., R. 36 E.	Thick beds of sandy marine or eolian deposits.	21	6–11	97. 9	16. 5
		22	11–23	98. 9	16. 8
Valkaria sand: About 100 feet north of Rector Road, SW¼NW¼ sec. 14, T. 24 S., R. 35 E.	Sandy marine sediments.	19	5–9	103. 0	15. 6
		20	19–28	104. 6	15. 0
Welaka sand: About 1.5 miles south of junction of State Highway No. 3 and South Patrick Drive on EauGallie Beach, about 100 feet east of street.	Sandy marine or eolian deposits.	34	3–18	101. 0	15. 0
		35	28–43	102. 2	15. 6
		36	59–80	102. 4	16. 0

[1] Based on AASHO Designation T99–70 (1).

[2] Mechanical analysis according to AASHO Designation T88–70 (1). Results by this procedure differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming

test data—Continued

Mechanical analysis [2]								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—							
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [3]	Unified [4]
								Pct.			
100	100	82	3	3	3	1	1	----------	NP	A-3(0)	SP
100	100	79	3	3	3	2	1	----------	NP	A-3(0)	SP
100	100	80	21	21	21	18	18	28	13	A-2-6(0)	SC
100	100	93	3	3	2	1	0	----------	NP	A-3(0)	SP
100	100	94	15	14	9	7	6	----------	NP	A-2-4(0)	SM
100	100	90	7	7	5	5	4	----------	NP	A-3(0)	SP-SM
100	100	84	4	3	2	2	2	----------	NP	A-3(0)	SP
100	100	79	5	4	4	3	3	----------	NP	A-3(0)	SP-SM
100	100	95	3	3	1	1	0	----------	NP	A-3(0)	SP
100	100	100	5	4	4	4	1	----------	NP	A-3(0)	SP-SM
100	100	100	4	4	4	4	2	----------	NP	A-3(0)	SP
100	100	91	3	2	2	2	1	----------	NP	A-3(0)	SP
100	100	90	6	6	5	5	3	----------	NP	A-3(0)	SP-SM
100	100	76	3	3	1	1	0	----------	NP	A-3(0)	SP
100	100	76	3	3	2	2	1	----------	NP	A-3(0)	SP
100	100	41	3	3	2	2	1	----------	NP	A-1-b(0)	SW

textural classes for soils.

[3] Based on AASHO Designation M 145-66 (1).

[4] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. An example of borderline classification is SP-SM.

[5] Nonplastic.

TABLE 9.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal high water table [1]	Flood hazard [2]	Depth from surface	Classification USDA	Classification Unified	Classification AASHO
	Inches	*Inches*		*Inches*			
Anclote: An	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–19	Sand	SP, SP–SM	A–3
				19–72	Sand	SP, SP–SM	A–3
*Astatula: As, At. For Urban land part of At, see Urban land.	>120	>120	None	0–5	Fine sand	SP–SM	A–3, A–2
				5–120	Fine sand	SP–SM, SP	A–3, A–2
Basinger: Ba	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–80	Sand	SP, SP–SM	A–3
Bradenton shallow variant: Br.	20–40	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–12	Fine sand	SP–SM, SP	A–3, A–2
				12–18	Sandy clay loam, sandy loam.	SC, SM–SC	A–2, A–6
				18–34	Sandy clay loam, sandy loam, loamy sand.	SM, SM–SC	A–2
*Canaveral: Ca, Cc. For Urban land part of Cc, see Urban land.	>120	10–40	None	0–32	Sand	SP	A–3
				32–80	Coarse sand	SP	A–3
Canova: Cd	>120	0–10	Continuously flooded each year for 3 to 6 months.	9–0	Peat	Pt	Organic
				0–13	Sand	SP, SP–SM	A–3
				13–34	Sandy clay loam, sandy loam.	SC, SM–SC	A–2, A–6
				34–57	Sandy clay loam, sandy loam.	SC, SM–SC	A–2, A–6
Chobee: Ch	>120	0–10	Continuously flooded each year for 1 to 6 months.	0–14	Sandy loam	SM, SM–SC	A–2
				14–38	Sandy clay loam, sandy loam.	SC, SM–SC	A–2, A–6
				38–63	Sandy clay loam, sandy loam, loamy sand.	SC, SM–SC, SM	A–2, A–6
Coastal beaches: Ck. No valid estimates can be made.	>120						
Cocoa: Co	20–54	>72	None	0–32	Sand	SP–SM	A–3
				32–38	Loamy sand	SM, SP–SM	A–2
Copeland: Cp	20–40	0–10	Flooded once in 5 to 20 years for 7 days to 1 month.	0–15	Loamy fine sand	SM	A–3
				15–22	Sandy clay loam, sandy loam.	SM–SC, SC	A–2
				22–30	Marl.		
*Eau Gallie: Eg	>120	0–10	Flooded once in 5 to 20 years for 7 days to 1 month.	0–22	Sand	SP, SP–SM	A–3
				22–35	Sand	SP–SM, SM	A–2, A–3
				35–55	Sand	SP, SP–SM	A–3
				55–61	Sandy clay loam, sandy loam, fine sandy loam.	SM, SM–SC, SC	A–2
				61–84	Loamy sand, sandy loam, loamy fine sand, fine sandy loam.	SM, SM–SC	A–2

See footnotes at end of table.

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in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions column of this table. The symbol > means greater than]

Percentage of coarse fragments greater than 3 inches in diameter	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel [3]	Concrete [4]
					Inches per hour	*Inches per inch of soil*	*pH*			
0	100	100	85–98	2–10	6.0–20.0	0.10–0.15	5.1–8.4	Low	High	Moderate.
0	100	100	85–98	2–10	6.0–20.0	0.05–0.10	6.1–8.4	Low	High	Low.
0	100	100	90–100	5–12	>20.0	0.05–0.10	4.5–6.5	Low	Low	Moderate.
0	100	100	90–100	4–12	>20.0	0.05–0.10	4.5–5.5	Low	Low	Moderate.
0	100	100	80–98	3–10	>20.0	0.03–0.07	4.5–7.8	Low	High	Moderate.
0	100	100	85–100	4–12	6.0–20.0	0.05–0.10	6.1–7.3	Low	High	Low.
0	100	90–100	80–95	25–40	0.6–6.0	0.15–0.20	6.1–8.4	Moderate	High	Low.
0	95–100	90–100	80–95	20–30	0.6–6.0	0.15–0.20	7.9–8.4	Low	High	Low.
0	100	80–100	75–95	1–3	>20.0	0.02–0.05	6.6–8.4	Low	Moderate	Low.
0	90–95	80–95	50–75	1–3	>20.0	0.02–0.05	6.6–8.4	Low	Moderate	Low.
					6.0–20.0	0.15–0.20	6.1–8.4	[5]	Moderate	Moderate.
0	100	100	90–100	3–10	6.0–20.0	0.02–0.05	6.1–8.4	Low	Moderate	Low.
0	100	100	75–95	30–50	0.6–2.0	0.10–0.15	6.1–8.4	Moderate	Moderate	Low.
0	100	95–100	75–95	25–45	0.6–2.0	0.10–0.15	7.4–8.4	Moderate	Moderate	Low.
0	100	100	85–95	15–25	2.0–6.0	0.10–0.15	6.1–7.3	Low	Moderate	Low.
0	100	95–100	80–95	25–40	0.6–2.0	0.10–0.15	7.4–8.4	Moderate	Moderate	Low.
0	100	95–100	80–95	20–40	0.6–2.0	0.10–0.15	7.4–8.4	Moderate to low.	Moderate	Low.
0	100	100	80–95	5–10	6.0–20.0	0.02–0.05	5.6–7.8	Low	Low	Low.
0	100	100	80–95	11–25	6.0–20.0	0.05–0.10	5.6–7.8	Low	Low	Low.
0	100	100	90–100	13–20	6.0–20.0	0.10–0.15	6.1–7.8	Low	High	Low.
0	100	90–100	85–95	20–35	0.6–2.0	0.10–0.15	7.4–8.4	Moderate to low.	High	Low.
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	3.9–5.5	Low	High	High.
0	100	100	85–99	5–20	0.6–6.0	0.05–0.10	5.1–7.3	Low	High	Moderate.
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	5.6–7.8	Low	High	Moderate.
0	100	100	80–99	14–35	0.6–6.0	0.10–0.15	5.6–7.8	Moderate to low.	High	Low.
0	100	100	80–99	13–25	6.0–20.0	0.10–0.15	5.6–8.4	Low	High	Low.

TABLE 9.—*Estimates of soil properties*

Soil series and map symbols	Depth to—		Flood hazard [2]	Depth from surface	Classification		
	Bedrock	Seasonal high water table [1]			USDA	Unified	AASHO
	Inches	*Inches*		*Inches*			
Eau Gallie:							
Eu	>120	10–40	None	0–22	Sand	SP, SP–SM	A–3
				22–35	Sand	SP–SM, SM	A–2, A–3
				35–55	Sand	SP, SP–SM	A–3
				55–61	Sandy clay loam, sandy loam, fine sandy loam.	SM, SM–SC, SC	A–2
				61–84	Loamy sand, sandy loam, loamy fine sand, fine sandy loam.	SM, SM–SC	A–2
Ew. For Felda part of Ew, see Felda series. For Winder part of Ew, see Winder series.	>120	0–10	Continuously flooded for more than 6 months.	0–22	Sand	SP, SP–SM	A–3
				22–35	Sand	SP–SM, SM	A–2, A–3
				35–55	Sand	SP, SP–SM	A–3
				55–61	Sandy clay loam, sandy loam, fine sandy loam.	SM, SM–SC, SC	A–2
				61–84	Loamy sand, sandy loam, loamy fine sand, fine sandy loam.	SM, SM–SC	A–2
*Felda:							
Fa	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–30	Sand	SP, SP–SM	A–3
				30–49	Sandy loam, sandy clay loam.	SM–SC, SC	A–2
				49–62	Sandy loam, loamy sand, sand.	SM, SP–SM	A–2
Fd	>120	10–40	None	0–30	Sand	SP, SP–SM	A–3
				30–49	Sandy loam, sandy clay loam.	SM–SC, SC	A–2
				49–62	Sandy loam, loamy sand, sand.	SM, SP–SM	A–2
Fe	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–30	Sand	SP, SP–SM	A–3
				30–49	Sandy loam, sandy clay loam.	SM–SC, SC	A–2
				49–62	Sandy loam, loamy sand, sand.	SM, SP–SM	A–2
Fg. For Winder part of Fe and Fg, see Winder series.	>120	0–10	Continuously flooded for more than 6 months.	0–30	Sand	SP, SP–SM	A–3
				30–49	Sandy loam, sandy clay loam.	SM–SC, SC	A–2
				49–62	Sandy loam, loamy sand, sand.	SM, SP–SM	A–2
*Floridana:							
Fn	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–12	Sand	SP–SM	A–3
				12–29	Sand	SP–SM, SP	A–3
				29–62	Sandy clay loam, sandy loam.	SM–SC, SC	A–2
Fo. For Chobee part of Fo, see Chobee series. For Felda part of Fo, see Felda series.	>120	0–10	Continuously flooded for 3 to 6 months.	0–12	Sand	SP–SM	A–3
				12–29	Sand	SP–SM, SP	A–3
				29–62	Sandy clay loam, sand.	SM–SC, SC	A–2
*Galveston: Ga. For Urban land part of Ga, see Urban land.	>120	40–60	None	0–80	Sand	SP	A–3

See footnotes at end of table.

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Percentage of coarse fragments greater than 3 inches in diameter	Percentage less than 3 inches passing sieve—				Permea-bility	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel [3]	Concrete [4]
					Inches per hour	*Inches per inch of soil*	*pH*			
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	3.9–5.5	Low	High	High.
0	100	100	85–99	5–20	0.6–6.0	0.05–0.10	5.1–7.3	Low	High	Moderate.
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	5.6–7.8	Low	High	Moderate.
0	100	100	80–99	20–35	0.6–6.0	0.10–0.15	5.6–7.8	Moderate to low.	High	Low.
0	100	100	80–99	13–25	6.0–20.0	0.10–0.15	5.6–8.4	Low	High	Low.
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	3.9–5.5	Low	High	High.
0	100	100	85–99	5–20	0.6–6.0	0.05–0.10	5.1–7.3	Low	High	Moderate.
0	100	100	75–99	2–8	6.0–20.0	0.02–0.05	5.6–7.8	Low	High	Moderate.
0	100	100	80–99	20–35	0.6–6.0	0.10–0.15	5.6–7.8	Moderate to low.	High	Low.
0	100	100	80–99	13–25	6.0–20.0	0.10–0.15	5.6–8.4	Low	High	Low.
0	100	100	80–95	2–5	6.0–20.0	0.02–0.05	5.1–7.8	Low	High	Low.
0	100	100	80–95	15–30	0.6–6.0	0.10–0.15	6.1–8.4	Moderate to low.	High	Low.
0	100	95–100	80–95	11–25	0.6–6.0	0.10–0.15	6.1–8.4	Low	High	Low.
0	100	100	80–95	2–5	6.0–20.0	0.02–0.05	5.1–7.8	Low	High	Low.
0	100	100	80–95	15–30	0.6–6.0	0.10–0.15	6.1–8.4	Moderate to low.	High	Low.
0	100	95–100	80–95	11–25	0.6–6.0	0.10–0.15	6.1–8.4	Low	High	Low.
0	100	100	80–95	2–5	6.0–20.0	0.02–0.05	5.1–7.8	Low	High	Low.
0	100	100	80–95	15–30	0.6–6.0	0.10–0.15	6.1–8.4	Moderate to low.	High	Low.
0	100	95–100	80–95	11–25	0.6–6.0	0.10–0.15	6.1–8.4	Low	High	Low.
0	100	100	80–95	2–5	6.0–20.0	0.02–0.05	5.1–7.8	Low	High	Low.
0	100	100	80–95	15–30	0.6–6.0	0.10–0.15	6.1–8.4	Moderate to low.	High	Low.
0	100	95–100	80–95	11–25	0.6–6.0	0.10–0.15	6.1–8.4	Low	High	Low.
0	100	100	75–95	5–10	2.0–6.0	0.10–0.15	6.1–7.3	Low	Moderate	Low.
0	100	100	80–95	2–8	6.0–20.0	0.05–0.10	6.1–7.8	Low	Moderate	Low.
0	100	100	85–95	20–30	0.6–2.0	0.10–0.15	6.6–8.4	Low	Moderate	Low.
0	100	100	75–95	5–10	2.0–6.0	0.10–0.15	6.1–7.3	Low	Moderate	Low.
0	100	100	80–95	2–8	6.0–20.0	0.05–0.10	6.1–7.8	Low	Moderate	Low.
0	100	100	85–95	20–30	0.6–2.0	0.10–0.15	6.6–8.4	Low	Moderate	Low.
0	100	95–100	75–80	1–4	>20.0	0.02–0.05	6.6–8.4	Low	Moderate	Low.

TABLE 9.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal high water table [1]	Flood hazard [2]	Depth from surface	Classification USDA	Classification Unified	Classification AASHO
	Inches	*Inches*		*Inches*			
Holopaw: Ho	>120	0–10	Continuously flooded for 1 to 3 months.	0–45	Sand	SP, SP–SM	A–3
				45–62	Sandy loam, sandy clay loam, fine sandy loam.	SM–SC, SM	A–2
				62–71	Sand, loamy sand, fine sand, loamy fine sand.	SM, SP–SM	A–2, A–3
Immokalee: Im	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–33	Sand	SP, SP–SM	A–3
				33–65	Sand	SM, SP–SM	A–2, A–3
				65–80	Sand	SP, SP–SM	A–3
*Malabar:							
Ma	>120	0–10	Flooded once in 1 to 5 years for 7 days to 1 month.	0–45	Sand	SP	A–3
				45–61	Sandy clay loam, sandy loam.	SM–SC, SC	A–2, A–6
				61–65	Sand	SP–SM	A–3, A–2
Mb. For Holopaw part of Mb, see Holopaw series. For Pineda part of Mb, see Pineda series.	>120	0–10	Continuously flooded for 1 to 3 months.	0–45	Sand	SP	A–3
				45–61	Sandy clay loam, sandy loam.	SM–SC, SC	A–2, A–6
				61–65	Sand	SP–SM	A–3, A–2
Micco: Mc	>120	0–10	Continuously flooded for longer than 6 months.	0–30	Peat	Pt	Organic
				30–38	Sand	SP, SP–SM, SM	A–3, A–2
				38–55	Sandy clay loam, sandy loam.	SC, SM–SC	A–2
Montverde: Me	>120	0–10	Continuously flooded for longer than 6 months.	0–54	Peat	Pt	Organic
				54–61	Sand	SP, SP–SM	A–3
				61–77	Sandy clay loam, sandy loam.	SC, SM–SC	A–2, A–6
*Myakka:							
Mk	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–22	Sand	SP, SP–SM	A–3
				22–35	Sand	SM, SP–SM	A–2, A–3
				35–46	Sand	SM, SP–SM	A–2, A–3
				46–63	Sand	SP, SP–SM	A–3
Mp	>120	0–10	Continuously flooded for 6 to 12 months.	0–22	Sand	SP, SP–SM	A–3
				22–35	Sand	SM, SP–SM	A–2, A–3
				35–46	Sand	SM, SP–SM	A–2, A–3
				46–63	Sand	SP, SP–SM	A–3
Mu. For Urban land part of Mu, see Urban land.	>120	20–40	None.				
Oldsmar: Od	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–36	Sand	SP, SP–SM	A–3
				36–51	Sand	SM, SP–SM	A–2, A–3
				51–55	Sand	SP, SP–SM	A–3
				55–93	Sandy clay loam, sandy loam.	SM–SC, SC	A–2
Orsino: Or	>120	20–40	None	0–22	Fine sand	SP	A–3
				22–81	Fine sand	SP, SP–SM	A–3
Palm Beach: Pb	>120	>120	None	0–54	Sand	SP	A–3
				54–105	Sand (mixed with shells and shell fragments).	SP, SW	A–3, A–1–b

See footnotes at end of table.

significant in engineering—Continued

Percentage of coarse fragments greater than 3 inches in diameter	Percentage less than 3 inches passing sieve— No. 4 (4. 7 mm.)	No. 10 (2. 0 mm.)	No. 40 (0. 42 mm.)	No. 200 (0. 074 mm.)	Permea-bility	Available water capacity	Reaction	Shrink-swell potential	Corrosivity: Uncoated steel [3]	Corrosivity: Concrete [4]
					Inches per hour	*Inches per inch of soil*	*pH*			
0	100	100	80–95	2–5	6. 0–20. 0	0. 02–0. 05	5. 6–7. 3	Low	High	Low.
0	100	100	80–95	15–30	2. 0– 6. 0	0. 10–0. 15	6. 6–7. 8	Low	High	Low.
0	100	100	80–95	8–20	6. 0–20. 0	0. 03–0. 08	6. 6–7. 8	Low	High	Low.
0	100	100	80–95	2–8	6. 0–20. 0	0. 02–0. 05	4. 5–5. 5	Low	High	High.
0	100	100	85–100	5–20	0. 6–6. 0	0. 10–0. 15	4. 5–5. 5	Low	High	High.
0	100	100	80–95	2–8	6. 0–20. 0	0. 02–0. 05	4. 5–5. 5	Low	High	High.
0	100	100	80–95	2–4	6. 0–20. 0	0. 02–0. 05	5. 6–8. 4	Low	High	Low.
0	100	100	90–100	20–40	0. 6–2. 0	0. 10–0. 15	6. 6–8. 4	Low	High	Low.
0	100	100	80–95	5–12	6. 0–20. 0	0. 02–0. 05	6. 6–8. 4	Low	High	Low.
0	100	100	80–95	2–4	6. 0–20. 0	0. 02–0. 05	5. 6–8. 4	Low	High	Low.
0	100	100	90–100	20–40	0. 6–2. 0	0. 10–0. 15	6. 6–8. 4	Low	High	Low.
0	100	100	80–95	5–12	6. 0–20. 0	0. 02–0. 05	6. 6–8. 4	Low	High	Low.
0					6. 0–20. 0	0. 20–0. 25	4. 1–5. 0	(5)	High	High.
0	100	100	80–100	2–15	6. 0–20. 0	0. 05–0. 10	5. 6–7. 8	Low	Moderate	High.
0	100	100	80–95	10–25	0. 6–6. 0	0. 10–0. 15	6. 1–8. 4	Moderate	Moderate	Low.
0					6. 0–20. 0	0. 20–0. 25	4. 5–6. 5	(5)	Moderate	Moderate.
0	100	100	75–95	3–7	6. 0–20. 0	0. 05–0. 10	5. 6–7. 8	Low	Moderate	Moderate.
0	100	100	75–95	25–40	0. 6–2. 0	0. 10–0. 15	5. 6–7. 8	Moderate	Moderate	Low.
0	100	100	80–95	2–8	6. 0–20. 0	0. 02–0. 05	4. 0–5. 5	Low	High	High.
0	100	100	85–95	8–20	0. 6–2. 0	0. 10–0. 15	4. 0–5. 5	Low	High	High.
0	100	100	85–95	8–20	0. 6–2. 0	0. 10–0. 15	4. 5–6. 5	Low	High	High.
0	100	100	80–90	2–10	6. 0–20. 0	0. 02–0. 05	4. 5–6. 5	Low	High	High.
0	100	100	80–95	2–8	6. 0–20. 0	0. 02–0. 05	4. 0–5. 5	Low	High	High.
0	100	100	85–95	8–20	0. 6–2. 0	0. 10–0. 15	4. 0–5. 5	Low	High	High.
0	100	100	85–95	8–20	0. 6–2. 0	0. 10–0. 15	4. 5–6. 5	Low	High	High.
0	100	100	80–90	2–10	6. 0–20. 0	0. 02–0. 05	4. 5–6. 5	Low	High	High.
0	100	100	80–95	2–10	6. 3–20. 0	0. 02–0. 05	4. 5–6. 0	Low	High	High.
0	100	100	85–95	8–20	2. 0–6. 0	0. 10–0. 15	4. 5–6. 0	Low	High	High.
0	100	100	80–90	2–10	2. 0–6. 0	0. 02–0. 05	6. 1–7. 8	Low	High	Moderate.
0	100	100	80–95	20–35	2. 0–6. 0	0. 10–0. 15	6. 1–7. 8	Low to moderate.	High	Low.
0	100	100	90–100	1–4	>20. 0	0. 02–0. 05	4. 5–6. 0	Low	Low	Moderate.
0	100	100	90–100	2–7	>20. 0	0. 02–0. 05	4. 5–6. 0	Low	Low	Moderate.
0	100	95–100	75–80	2–4	>20. 0	0. 02–0. 05	7. 4–8. 4	Low	Moderate	Low.
0–5	85–100	50–75	20–60	1–4	>20. 0	0. 02–0. 05	7. 4–8. 4	Low	Moderate	Low.

TABLE 9.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bed-rock	Depth to— Seasonal high water table [1]	Flood hazard [2]	Depth from surface	Classification USDA	Classification Unified	Classification AASHO
	Inches	*Inches*		*Inches*			
*Paola: PfB, PfD, Ph. For Urban land part of Ph, see Urban land.	>120	>120	None	0–90	Fine sand	SP	A-3
Parkwood moderately fine subsoil variant: Pk.	>120	0–10	Flooded once in 1 to 5 years for 7 days to 1 month.	0–7	Fine sand	SP, SP-SM	A-3
				7–10	Fine sandy loam, sandy clay loam.	SM-SC	A-2
				10–30	Sandy clay loam	SC	A-2, A-6
				30–65	Fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2
Pineda: Pn	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–19	Sand	SP, SP-SM	A-3
				19–35	Sand	SP, SP-SM	A-3
				35–38	Loamy sand, sandy loam.	SP-SM, SM	A-2
				38–60	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2
				60–64	Loamy sand	SM, SP-SM	A-2, A-3
Po	>120	10–40	None	0–19	Sand	SP, SP-SM	A-3
				19–35	Sand	SP, SP-SM	A-3
				35–38	Loamy sand, sandy loam.	SP-SM, SM	A-2
				38–60	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2
				60–64	Loamy sand	SM, SP-SM	A-2, A-3
Pineda dark surface variant: Pp.	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–20	Sand	SP, SP-SM	A-3
				20–40	Sand	SP, SP-SM	A-3
				40–60	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2
*Pomello: Ps, Pu. For Urban land part of Pu, see Urban land.	>120	30–40	None	0–50	Sand	SP, SP-SM	A-3
				50–62	Sand	SM, SP-SM	A-2, A-3
				62–80	Sand	SP, SP-SM	A-3
Pompano: Pw	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–90	Sand	SP, SP-SM	A-3
Quartzipsamments, smoothed: Qr. No valid estimates can be made.	>120						
Satellite: Sa	>120	10–40	None	0–84	Sand	SP	A-3
St. Johns: Sb	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–11	Sand	SP, SP-SM	A-3
				11–19	Sand	SP, SP-SM	A-3
				19–31	Sand	SM, SP-SM	A-2, A-3
				31–70	Sand	SP, SP-SM	A-3
Sc	>120	0–10	Continuously flooded for longer than 6 months.	0–11	Sand	SP, SP-SM	A-3
				11–19	Sand	SP, SP-SM	A-3
				19–31	Sand	SM, SP-SM	A-2, A-3
				31–70	Sand	SP, SP-SM	A-3

See footnotes at end of table.

significant in engineering—Continued

Percentage of coarse fragments greater than 3 inches in diameter	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
	No. 4 (4. 7 mm.)	No. 10 (2. 0 mm.)	No. 40 (0. 42 mm.)	No. 200 (0. 074 mm.)					Uncoated steel [3]	Concrete [4]
					Inches per hour	*Inches per inch of soil*	*pH*			
0	100	100	80–100	1–4	>20. 0	0. 02–0. 05	4. 5–6. 0	Low	Low	High.
0	100	100	80–95	3–10	6. 0–20. 0	0. 10–0. 15	6. 6–7. 8	Low	High	Low.
0	100	100	80–95	20–30	0. 6–2. 0	0. 10–0. 15	7. 4–8. 4	Low	High	Low.
0	100	90–100	60–70	25–40	0. 6–2. 0	0. 10–0. 15	7. 4–8. 4	Moderate	High	Low.
0	100	100	85–100	5–20	6. 0–20. 0	0. 05–0. 10	7. 4–7. 8	Low	High	Low.
0	100	100	75–95	2–8	6. 0–20. 0	0. 05–0. 10	5. 1–6. 5	Low	High	Moderate.
0	100	100	75–95	2–8	6. 0–20. 0	0. 05–0. 10	6. 1–7. 8	Low	High	Moderate.
0	100	100	75–95	10–20	6. 0–20. 0	0. 05–0. 10	6. 6–8. 4	Low	High	Moderate.
0	100	100	75–95	20–30	2. 0–6. 0	0. 10–0. 15	6. 6–8. 4	Low to moderate.	High	Low.
0	100	100	75–95	5–15	6. 0–20. 0	0. 05–0. 10	6. 6–8. 4	Low	High	Low.
0	100	100	75–95	2–8	6. 0–20. 0	0. 05–0. 10	5. 1–6. 5	Low	High	Moderate.
0	100	100	75–95	2–8	6. 0–20. 0	0. 05–0. 10	6. 1–7. 8	Low	High	Moderate.
0	100	100	75–95	10–20	6. 0–20. 0	0. 05–0. 10	6. 6–8. 4	Low	High	Moderate.
0	100	100	75–95	20–30	2. 0–6. 0	0. 10–0. 15	6. 6–8. 4	Low to moderate.	High	Low.
0	100	100	75–95	5–15	6. 0–20. 0	0. 05–0. 10	6. 6–8. 4	Low	High	Low.
0	100	100	75–95	2–8	6. 0–20. 0	0. 10–0. 15	5. 6–8. 4	Low	High	Low.
0	100	100	75–95	2–8	6. 0–20. 0	0. 05–0. 10	5. 6–8. 4	Low	High	Low.
0	100	100	75–95	15–30	2. 0–6. 0	0. 10–0. 15	5. 6–8. 4	Low to moderate.	High	Low.
0	100	100	75–95	2–4	>20. 0	0. 02–0. 05	4. 5–5. 5	Low	Low	High.
0	100	100	85–95	8–20	2. 0–6. 0	0. 10–0. 15	4. 5–5. 5	Low	Low	High.
0	100	100	75–95	2–8	6. 0–20. 0	0. 02–0. 05	4. 5–5. 5	Low	Low	High.
0	100	100	75–90	3–10	>20. 0	0. 03–0. 08	4. 5–7. 8	Low	High	Low.
0	100	100	50–75	1–4	>20. 0	0. 02–0. 05	4. 5–6. 0	Low	Moderate	High.
0	100	100	75–95	3–7	>20. 0	0. 10–0. 15	4. 5–5. 5	Low	High	High.
0	100	100	75–95	3–7	>20. 0	0. 03–0. 08	4. 5–5. 5	Low	High	High.
0	100	100	85–95	8–20	0. 6–2. 0	0. 10–0. 15	4. 5–5. 5	Low	High	High.
0	100	100	80–90	2–8	>20. 0	0. 03–0. 08	4. 5–5. 5	Low	High	High.
0	100	100	75–95	3–7	>20. 0	0. 10–0. 15	4. 5–5. 5	Low	High	High.
0	100	100	75–95	3–7	>20. 0	0. 03–0. 08	4. 5–5. 5	Low	High	High.
0	100	100	75–95	2–8	0. 6–2. 0	0. 10–0. 15	4. 5–5. 5	Low	High	High.
0	100	100	85–95	8–20	>20. 0	0. 03–0. 08	4. 5–5. 5	Low	High	High.

TABLE 9.—*Estimates of soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal high water table [1]	Flood hazard [2]	Depth from surface	Classification USDA	Classification Unified	Classification AASHO
	Inches	*Inches*		*Inches*			
St. Lucie: SfB, SfD	>120	>120	None	0–120	Fine sand	SP	A–3
Spoil banks: Sp. No valid estimates can be made.							
Swamp: Sw. No valid estimates can be made.		0	Continuously flooded for most of the year.				
Tavares: Ta	>120	40–60	None	0–80	Fine sand	SP, SP–SM	A–3
Terra Ceia: Tc	>120	0–10	Continuously flooded for longer than 6 months.	0–70	Muck	Pt	Organic
Tidal marsh: Tm. No valid estimates can be made.		0	Continuously flooded.				
Tidal swamp: Ts. No valid estimates can be made.		0	Continuously flooded.				
Tomoka: Tw	>120	0–10	Continuously flooded for longer than 6 months.	0–27 27–35 35–55	Muck Sand Sandy clay loam, sandy loam.	Pt SP, SP–SM SM–SC, SC, SM	Organic A–3 A–2
Urban land: Ur. No valid estimates can be made.							
Valkaria: Va	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–15 15–80	Sand Sand	SP, SP–SM SP, SP–SM	A–3 A–3
Wabasso: Wa	>120	0–10	Flooded once in 1 to 5 years for 2 to 7 days.	0–23 23–28 28–34 34–62	Sand Sand Sand Sandy clay loam, sandy loam.	SP, SP–SM SP–SM SM, SP–SM SC, SM–SC	A–3 A–2, A–3 A–2, A–3 A–2
Welaka: We	>120	40–60	None	0–55 55–80	Sand Sand (with shell fragments).	SP SP, SW	A–3 A–3, A–1
Winder: Wn	>120	0–10	Flooded more than once each year for 2 to 7 days.	0–12 12–17 17–31 31–47 47–65	Loamy sand Sandy loam Sandy clay loam Sandy clay loam, sandy loam. Sandy clay loam, sandy loam.	SM SM SC, SM–SC SC, SM–SC, SM SC, SM–SC, SM	A–2 A–2 A–2, A–6 A–2 A–2

[1] Level expected during the normal wet season.
[2] Water standing or flowing above the surface of the soil under natural conditions without artificial drainage.
[3] Estimates of corrosivity for uncoated steel are based on the drainage class (wetness) and texture of the soil, the estimated total acidity, resistivity of field capacity, and conductivity.

significant in engineering—Continued

Percentage of coarse fragments greater than 3 inches in diameter	Percentage less than 3 inches passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity: Uncoated steel [3]	Corrosivity: Concrete [4]
					Inches per hour	*Inches per inch of soil*	*pH*			
0	100	100	90–100	1–4	>20.0	0.02–0.05	4.5–6.5	Low	Low	Moderate.
0	100	100	85–100	2–7	>20.0	0.03–0.08	4.5–6.0	Low	Low	High.
----------	--------	--------	--------	--------	6.0–20.0	0.20–0.25	5.6–8.4	(5)	Moderate	Moderate.
----------	--------	--------	--------	--------	6.0–20.0	0.20–0.25	4.0–4.5	(5)	High	Low.
0	100	95–100	80–90	2–10	6.0–20.0	0.05–0.10	4.0–4.5	Low	Low	Low.
0	100	100	85–95	20–35	0.6–6.0	0.10–0.15	4.0–4.5	Moderate to low.	Moderate	Low.
0	100	100	75–95	2–8	>20.0	0.03–0.08	5.1–7.3	Low	High	Low.
0	100	100	75–95	3–10	>20.0	0.03–0.08	5.1–8.4	Low	High	Low.
0	100	100	95–100	2–8	6.0–20.0	0.03–0.08	4.5–5.5	Low	High	High.
0	100	100	95–100	5–12	6.0–20.0	0.10–0.15	4.5–5.5	Low	High	High.
0	100	100	95–100	8–20	0.6–2.0	0.10–0.15	4.5–5.5	Low	High	High.
0	100	100	95–100	20–35	0.6–2.0	0.10–0.15	5.6–7.8	Moderate	High	Low.
0	100	100	65–85	1–4	>20.0	0.02–0.05	4.0–6.5	Low	Moderate	Moderate.
0	95–100	80–95	20–60	1–4	>20.0	0.02–0.05	7.9–8.4	Low	Moderate	Low.
0	100	100	65–90	13–20	6.0–20.0	0.05–0.10	5.6–7.8	Low	High	Low.
0	100	100	65–90	15–25	0.6–2.0	0.10–0.15	6.1–8.4	Low	High	Low.
0	100	95–100	65–90	25–40	0.6–2.0	0.10–0.15	6.1–8.4	Moderate	High	Low.
0	100	90–95	60–75	20–35	0.6–2.0	0.10–0.15	6.1–8.4	Moderate	High	Low.
0	100	100	65–85	20–35	0.6–2.0	0.10–0.15	6.1–8.4	Moderate	High	Low.

[4] Estimates of corrosivity for concrete are based on the soil texture and reaction and the estimated sodium and/or magnesium sulfate present in the soil.

[5] The shrink-swell potential applies only to mineral soils. Organic soils have a high subsidence potential.

TABLE 10.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand	Road fill	Dikes and levees
Anclote: An	Poor: sand texture; wetness.	Good	Good: hazard of high water table in places.	Rapid permeability
*Astatula: As, At. For Urban land part of At, see Urban land.	Poor: sand texture	Good	Good	Very rapid permeability; unstable, loose, erodible sand.
Basinger: Ba	Poor: sand texture; wetness.	Fair: excessive fines	Good: hazard of high water table in places.	Very rapid permeability; unstable, loose, erodible sand.
Bradenton shallow variant: Br	Fair: loamy texture near surface.	Poor: excessive fines; thickness of suitable material.	Fair: thickness of suitable material; hazard of high water table in places.	Rock within 40 inches of surface.
*Canaveral: Ca, Cc. For Urban land part of Cc, see Urban land.	Poor: sand texture	Fair: contains shell fragments.	Good	Very rapid permeability; unstable, loose, erodible sand.
Canova: Cd	Fair: thin organic surface layer; wetness.	Poor: organic material in surface layer.	Poor: organic material in surface layer.	Organic material in surface layer; rapid permeability.
Chobee: Ch	Fair: sand texture; wetness.	Poor: excessive fines	Good: hazard of high water table in places.	Features generally favorable.
Coastal beaches: Ck	Poor: sand texture; salinity.	Fair: contains shell fragments.	Poor: flooding	Loose, erodible sand; tidal action.
Cocoa: Co	Poor: sand texture; rock within 54 inches of surface.	Poor: excessive fines; rock within 54 inches of surface.	Good	Rapid permeability; loose, erodible sand; rock within 54 inches of surface.
Copeland: Cp	Poor: sand texture; rock within 40 inches of surface; wetness.	Poor: organic material; rock within 40 inches of surface.	Fair: thickness of suitable material; hazard of high water table in places.	Rapid permeability; rock within 40 inches of surface.
*Eau Gallie: Eg, Eu	Poor: sand texture	Good	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
Ew. For Felda part of Ew, see Felda series. For Winder part of Ew, see Winder series.	Poor: sand texture; flooding.	Poor: excessive fines; wetness.	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.

interpretations

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Soil features affecting—Continued				
Drainage	Excavated, aquifer-fed ponds	Sprinkler irrigation	Subsurface irrigation	Sanitary landfill
Low position; high water table; no natural outlets in some areas; flooding.	Unstable, loose sand	Wetness; flooding	Flooding	High water table; flooding.
Excessively drained	Deep over water table	Low available water capacity.	Very rapid permeability; deep over water table.	Features generally favorable.
Low position; high water table; no natural outlets in some areas; flooding.	Unstable, loose sand	Very low to low available water capacity; wetness; flooding.	Flooding; high water table.	High water table; flooding.
Rock within 40 inches of surface; high water table.	Rock within 40 inches of surface.	Features generally favorable.	Rock within 40 inches of surface.	Rock within 40 inches of surface; high water table.
Moderately deep over water table.	Moderately deep over water table; very rapid permeability; unstable, loose sand.	Very low available water capacity.	Moderately deep over water table; very rapid permeability.	High water table.
Low position; high water table; few natural outlets; flooding.	Flooding	Wetness; flooding	Flooding	High water table; flooding.
Low position; no natural outlets in some areas; high water table; flooding.	Flooding	Wetness; flooding	Flooding	High water table; flooding.
Tidal flooding	Tidal flooding	Tidal flooding	Tidal flooding	Tidal flooding.
Well drained	Deep over water table; rock within 54 inches of surface.	Very low available water capacity.	Rapid permeability; deep over water table.	Rock within 54 inches of surface.
Rock within 40 inches of surface; high water table; flooding.	Rock within 40 inches of surface; flooding.	Rock within 40 inches of surface; wetness; flooding.	Rock within 40 inches of surface; flooding.	Rock within 40 inches of surface; high water table; flooding.
High water table	Periodically deep over water table; unstable, loose sand.	Very low available water capacity in surface and subsurface layers; wetness.	Features generally favorable.	High water table.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Very low available water capacity in surface and subsurface layers; wetness; flooding.	Flooding	Flooding.

TABLE 10.—*Engineering*

Soil series and map symbols	Suitability as source of— Topsoil	Sand	Road fill	Soil features affecting— Dikes and levees
*Felda:				
Fa, Fd	Poor: sand texture; wetness.	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
Fe	Poor: sand texture; wetness.	Poor: excessive fines	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
Fg. For Winder part of Fe and Fg, see Winder series.	Poor: sand texture; wetness; flooding.	Poor: excessive fines; flooding.	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
*Floridana:				
Fn	Poor: sand texture; wetness.	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability in subsurface layer.
Fo. For Chobee part of Fo, see Chobee series. For Felda part of Fo, see Felda series.	Poor: sand texture; wetness; flooding.	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability in subsurface layer.
*Galveston: Ga. For Urban land part of Ga, see Urban land.				
Holopaw: Ho	Poor: sand texture	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability above a depth of 45 inches; unstable, loose, erodible sand.
Immokalee: Im	Poor: sand texture	Good to fair: excessive fines.	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers; unstable, loose, erodible sand.
*Malabar: Ma, Mb. For Holopaw part of Mb, see Holopaw series. For Pineda part of Mb, see Pineda series.	Poor: sand texture	Good	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
Micco: Mc	Poor: organic material; wetness.	Not available	Poor: organic material	Organic material
Montverde: Me	Poor: organic material; wetness; flooding.	Not available	Poor: organic material	Organic material

interpretations—Continued

Soil features affecting—Continued				
Drainage	Excavated, aquifer-fed ponds	Sprinkler irrigation	Subsurface irrigation	Sanitary landfill
Low position; high water table; no natural outlets in some areas.	Features generally favorable.	Very low available water capacity in surface and subsurface layers.	Features generally favorable.	High water table.
Low position; high water table; no natural outlets in some areas; flooding.	Rock in places; flooding	Very low available water capacity in surface and subsurface layers; wetness; flooding.	Rock in places; flooding	Rock near the surface in places; high water table; flooding.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Very low available water capacity in surface and subsurface layers; wetness; flooding.	Flooding	Flooding.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Wetness; flooding	Flooding	High water table; flooding.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Wetness; flooding	Flooding	High water table; flooding.
Low position; high water table; flooding.	Loose sand above a depth of 45 inches; flooding.	Very low available water capacity above a depth of 45 inches; wetness; flooding.	Flooding	High water table; flooding.
High water table	Loose sand	Very low available water capacity in surface and subsurface layers; wetness.	Seasonally deep over water table.	High water table.
Low position; high water table; no natural outlets in some areas.	Unstable, loose sand above a depth of 45 inches.	Very low available water capacity above a depth of 45 inches; wetness.	Flooding	High water table.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Wetness; flooding	Flooding	Organic material; high water table; flooding.
Low position; high water table; no natural outlets in some areas; flooding.	Flooding	Wetness; flooding	Flooding	Organic material; high water table; flooding.

TABLE 10.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand	Road fill	Dikes and levees
*Myakka: Mk, Mu. For Urban land part of Mu, see Urban land.	Poor: sand texture	Good to fair: excessive fines.	Good: hazard of high water table in places.	Loose, erodible sand
Mp	Poor: sand texture; wetness.	Poor: excessive fines; wetness.	Good: hazard of high water table in places.	Loose, erodible sand
Oldsmar: Od	Poor: sand texture	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability; loose, erodible sand.
Orsino: Or	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
Palm Beach: Pb	Poor: sand texture	Fair: contains shell fragments.	Good	Very rapid permeability; loose, erodible sand.
*Paola: PfB, Ph. For Urban land part of Ph, see Urban land.	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
PfD	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
Parkwood moderately fine subsoil variant: Pk.	Fair: loamy texture; thickness of suitable material.	Poor: excessive fines	Good: hazard of high water table in places.	Very rapid permeability in the substratum.
Pineda: Pn, Po	Poor: sand texture	Good	Good: hazard of high water table in places.	Rapid permeability above a depth of 38 inches.
Pineda dark surface variant: Pp	Fair: sand texture; moderate organic material.	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability in surface layer.
*Pomello: Ps, Pu. For Urban land part of Pu, see Urban land.	Poor: sand texture	Good	Good	Rapid permeability; loose, erodible sand.
Pompano: Pw	Poor: sand texture	Fair: excessive fines	Good: hazard of high water table in places.	Very rapid permeability loose, erodible sand.
Quartzipsamments, smoothed: Or	Poor: sand texture	Variable	Variable	Variable
Satellite: Sa	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.

interpretations—Continued

Soil features affecting—Continued				
Drainage	Excavated, aquifer-fed ponds	Sprinkler irrigation	Subsurface irrigation	Sanitary landfill
High water table	Unstable, loose sand	Wetness	Seasonally deep over water table.	High water table.
Low position; high water table; no natural outlets in some areas; flooding.	Unstable, loose sand; flooding.	Wetness; flooding	Flooding	Flooding.
High water table	Unstable, loose sand; seasonally deep over water table.	Very low available water capacity in surface and subsurface layers; wetness.	Seasonally deep over water table.	High water table.
Moderately deep over water table.	Moderately deep over water table; very rapid permeability; unstable, loose sand.	Very low available water capacity.	Moderately deep over water table; very rapid permeability.	High water table.
Excessively drained	Deep over water table	Very low available water capacity.	Deep over water table; very rapid permeability.	Features generally favorable.
Excessively drained	Deep over water table	Very low available water capacity.	Deep over water table; very rapid permeability.	Features generally favorable.
Excessively drained	Deep over water table; strongly sloping.	Very low available water capacity.	Deep over water table; strongly sloping; very rapid permeability.	Slope.
High water table	Features generally favorable.	Wetness	Features generally favorable.	High water table.
High water table	Seasonally deep over water table.	Very low available water capacity above a depth of 38 inches; wetness.	Seasonally deep over water table.	High water table.
High water table	Seasonally deep over water table.	Moderate to low available water capacity.	Seasonally deep over water table.	High water table.
Moderately deep over water table.	Seasonally moderately deep over water table; rapid permeability; unstable, loose sand.	Very low available water capacity.	Seasonally deep over water table; rapid permeability.	High water table.
Low position; high water table; no natural outlets in some areas; flooding.	Unstable, loose sand	Very low available water capacity; wetness; flooding.	Flooding	High water table; flooding.
Variable	Variable	Variable	Variable	Variable.
Moderately high water table.	Unstable, loose sand; moderately high water table.	Very low available water capacity.	Very rapid permeability; seasonally deep over water table.	High water table.

TABLE 10.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand	Road fill	Dikes and levees
St. Johns:				
Sb	Fair: sand texture; moderate organic material; thickness of suitable material.	Fair: excessive fines	Good: hazard of high water table in places.	Very rapid permeability; loose, erodible sand.
Sc	Fair: sand texture; moderate organic material; thickness of suitable material.	Fair: excessive fines	Good: hazard of high water table in places.	Very rapid permeability; loose, erodible sand.
St. Lucie:				
SfB	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
SfD	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
Spoil banks: Sp	Poor: sand texture	Variable	Variable	Variable material
Swamp: Sw	Variable	Variable	Variable	Variable material
Tavares: Ta	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
Terra Ceia: Tc	Poor: organic material; wetness.	Poor: not available	Poor: organic material	Organic material
Tidal marsh: Tm and Tidal swamp: Ts.	Poor: salinity; variable shelly texture; wetness.	Poor: variable material; tidal flooding.	Poor: variable material; tidal flooding.	Variable material
Tomoka: Tw	Poor: organic material; wetness.	Poor: not available	Poor: organic material	Organic material
Urban land: Ur. Present land use precludes other uses.				
Valkaria: Va	Poor: sand texture	Fair: excessive fines	Good: hazard of high water table in places.	Very rapid permeability; loose, erodible sand.
Wabasso: Wa	Poor: sand texture	Fair: excessive fines	Good: hazard of high water table in places.	Rapid permeability in surface and subsurface layers.
Welaka: We	Poor: sand texture	Good	Good	Very rapid permeability; loose, erodible sand.
Winder: Wn	Fair: loamy texture near surface; wetness.	Poor: excessive fines	Good: hazard of high water table in places.	Features generally favorable.

interpretations—Continued

Soil features affecting—Continued				
Drainage	Excavated, aquifer-fed ponds	Sprinkler irrigation	Subsurface irrigation	Sanitary landfill
Low position; shallow over water table; no natural outlets in some areas; flooding.	Flooding; loose sand	Wetness; flooding.	Flooding	High water table.
Low position; shallow over water table; no natural outlets in some areas; flooding.	Flooding	Flooding wetness	Flooding	Flooding.
Excessively drained	Deep over water table; very rapid permeability.	Very low available water capacity.	Deep over water table; very rapid permeability.	Features generally favorable.
Excessively drained	Deep over water table; slope; very rapid permeability.	Very low available water capacity.	Deep over water table; slope; very rapid permeability.	Slope.
Variable	Variable	Variable	Variable	Variable.
Low position; shallow over water table; no natural outlets in some areas; flooding.	Variable material; flooding.	Wetness; flooding	Variable material; flooding.	Variable material; high water table; flooding.
Moderately deep over water table.	Seasonally deep over water table; very rapid permeability; loose sand.	Very low available water capacity.	Seasonally deep over water table; very rapid permeability.	High water table.
Low position; shallow over water table; no natural outlets in some areas; flooding.	Frequent flooding	Wetness; flooding	Flooding	Organic material; high water table; flooding.
Low position; tidal flooding.	Tidal flooding	Variable material; tidal flooding.	Tidal flooding	Tidal flooding.
Low position; shallow over water table; no natural outlets in some areas; flooding.	Frequent flooding	Wetness; flooding	Flooding	Organic material; high water table; flooding.
Low position; shallow over water table; no natural outlets in some areas; flooding.	Flooding; loose sand	Very low to low available water capacity; wetness; flooding.	Flooding; seasonally deep over water table.	High water table; flooding.
Shallow over water table	Seasonally deep over water table; unstable.	Very low to low available water capacity in surface and subsurface layers.	Features generally favorable.	High water table.
Well drained	Moderately deep over water table; very rapid permeability; unstable, loose sand.	Very low available water capacity.	Moderately deep over water table; very rapid permeability.	High water table.
Shallow over water table; flooding.	Features generally favorable.	Wetness; flooding	Flooding	High water table; flooding.

Soil texture is described in table 9 in the standard terms used by the Department of Agriculture. These terms take into account the relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. Sandy clay loam, for example, is soil material that is 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand. Sand, silt, clay, and some of the other terms used in USDA textural classification are defined in the Glossary.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 9 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

The shrink-swell potential is the relative change in volume of a soil material with changes in moisture content; that is, the extent to which the soil shrinks when dry and swells when wet. The extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils can cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Corrosivity, as used in table 9, pertains to soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. Corrosivity for concrete is influenced mainly by the content of sodium or magnesium sulfate, but also by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* indicates a low probability of soil-induced corrosion damage. A rating of *moderate* indicates a moderate probability of such damage. A rating of *high* indicates a high probability of such damage. Protective measures for steel and more resistant concrete are needed to avoid or minimize damage.

Engineering interpretations

The suitability ratings and comments in table 10 are for modal soil profiles and are to be used only as a guide. They are not intended to replace field tests or laboratory analysis for specific uses that require exacting determinations.

Table 10 rates the soils according to their suitability as a source of topsoil, sand, or road fill. It also names soil features that affect the construction of dikes and levees, drainage, excavated aquifer-fed ponds, sprinkler irrigation, subsurface irrigation, and sanitary landfill. These interpretations are for a normal undisturbed soil profile. They are determined partly by studying the properties of the soils, partly by studying test data, and partly by using the results of actual field experience, where the performance and predictable behavior of the soils have been studied.

Ratings of *good*, *fair*, and *poor* are used to express the suitability of the soils as a source of topsoil, sand, or road fill.

Topsoil is a term used to designate a soil or soil material, ordinarily rich in organic matter, that is used to topdress lawns, gardens, roadbanks, and the like. A soil material must be friable, easily workable, productive, and more than 20 inches thick if it is to be given a rating of good as a source of topsoil.

Suitability as a source of sand is based on the probability that delineated areas of the soil contain deposits of sand that can be used in concrete, bituminous mixtures, and other construction materials. Estimates of probability are based on the upper 4 to 6 feet of soil. The ratings do not indicate the quality or size of the deposits. A probable good source of sand would be a soil in the SP Unified soil group. Increases in the amount of silt and clay in a soil decrease its suitability as a probable source of sand.

Road fill is material used to build low embankments for roads. A soil that has a rating of good must be thicker than 5 feet at the undisturbed source, must have low shrink-swell potential, and must have good or excellent ability to support traffic. Soils that have less desirable properties are given a rating of fair or poor as a source of road fill, depending upon the extent of the adverse properties.

Dikes and levees are low structures designed to impound or divert water. Permeability of the soil material is important. Slow or moderate permeability is desirable. Stability, erodibility, and compaction are also important features in embankment material.

The factors considered for drainage are those features or qualities of the soil that affect the installation and performance of surface and subsurface drainage systems. Among the limiting factors are permeability and texture of the soil, position in the landscape, depth to water table, depth to rock, flooding, and availability of outlets to remove excess water.

Excavated ponds are bodies of water created by excavating a pit or dugout. They may be fed by ground water aquifers or by surface runoff from surrounding areas. Considered here are those excavated ponds fed by ground water aquifers. Properties affecting these ponds are the existence of and depth to a permanent water table, permeability, danger of flooding, and properties that interfere with excavation, such as depth to hard rock and unstable side slopes.

Sprinkler irrigation and subsurface irrigation are the two methods used in Brevard County. Water for sprinkler irrigation is pumped through pipes and is applied to the soil through sprinklers in a way that simulates rain. Soil features that most affect sprinkler irrigation in this county are wetness, flooding, available water capacity, and thickness of root zone.

In subsurface irrigation, the water table is maintained within controlled limits. It permits adequate capillary

movement of water from the water table into the root zone. Open ditches generally are used for this kind of irrigation, and the same system can be used for removing excess water after heavy rains, as well as for irrigation. Subsurface irrigation is feasible only when the soils are nearly level and have a water table near the surface. Soil features that affect subsurface irrigation are depth to water table, permeability, depth to rock, and flooding. Moderate permeability and shallow rock cause difficulty in the establishment and operation of this kind of system in some places.

Water for irrigation can be obtained from artesian wells, ground water wells, streams, natural lakes, and constructed irrigation pits. In this county, however, most of the irrigation water comes from artesian wells, but some artesian wells are too salty to be used for irrigation.

Sanitary landfill is a method of disposing of refuse in dug trenches. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil features that affect sanitary landfills are high water table, flooding, depth to rock, and organic materials. The best soils for this use have moderately slow permeability, can withstand heavy traffic, and are friable and easy to excavate. Soils in Brevard County were investigated only to a depth of about 6 feet. Onsite determination is needed if trenches are to be dug much deeper than 6 feet.

Formation and Classification of Soils

This section has three main parts. The first part describes the factors of soil formation as they affect soils in Brevard County. The second part explains processes of soil formation. The third part defines the system of classifying soils and classifies the soils in the county according to that system. Terminology used in describing soils is that given in the Soil Survey Manual (*11*). The soil classification is according to the current system (*9*, *12*), which was adopted by the Cooperative Soil Survey in 1965.

Factors of Soil Formation

Soil is produced by forces of weathering and soil formation acting on the parent material that has been deposited or accumulated by geologic agencies. The kind of soil that develops depends on five major factors. These factors are the climate under which soil material existed since accumulation, the plant and animal life in and on the soil, the type of parent material, the relief or lay of the land, and the length of time the forces of soil formation have acted on the soil material.

The five soil-forming factors are interdependent; each modifies the effect of the others. Any one of the five factors can have more influence than the others on the foundation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has only weakly expressed horizons. The effect of the parent material is modified greatly in some places by the effects of climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by more than one of the five factors, but in some places all but one factor may have little effect. A modification or variation in any of these factors results in a different soil.

Living organisms

Both plants and animals play an important role in the formation of soils. The kinds and numbers of plants and animals that live in and on the soil are governed largely by climate and, to a lesser and varying degree, by each of the other soil-forming factors.

Living organisms furnish organic matter to soils, alter soils through natural mixing and stirring, and move plant nutrients from the lower horizons to the upper horizons. They also promote changes in structure and porosity.

Micro-organisms, including bacteria and fungi, help to weather and break down minerals and to decompose organic matter. They are most numerous in the upper few inches of the soil. Earthworms and some other small animals infest soil material, alter its chemical composition, and mix it with other soil material. The native vegetation in the county has affected soil formation more than other living organisms.

Mixed forests of pine and scattered oak and hickory covered parts of the Atlantic Coastal Ridge. Other parts were covered by dense stands of sand pine. The flatwoods areas supported an open forest of pines and an undergrowth of saw-palmetto, gallberry, and numerous native grasses. Scattered cabbage palm hammocks were also in the flatwoods. Vegetation in the marshes was sawgrass, sand cordgrass, and other water-tolerant shrubs, sedges, and grasses. Cypress, bay, gum, and maple were in swampy areas. The Atlantic Coastal Ridge had a cover of saw-palmetto and scrubby live oaks.

Man has influenced the formation of soils by clearing the forests, cultivating the soils, draining wet areas, and introducing different kinds of plants. The complex of living organisms that affect soil formation has been drastically changed as a result of man's activities. Except for loss of organic matter, few results of man's activities are yet apparent.

Climate

The climate of Brevard County is humid subtropical. Extreme temperatures are moderated by the waters of the Atlantic Ocean, the Indian and Banana Rivers, and large inland lakes. These waters contribute to the high humidity of the county. The climate in summer is uniform throughout the county, but winters are slightly milder in the southern part of the county and in the southern part of Merritt Island. The climate, however, accounts for few differences among soils. Rainfall averages between about 50 and 55 inches a year.

A climate such as this aids in the rapid decomposition of organic matter and hastens chemical reactions in the soil. The heavy rainfall leaches the soils of most plant nutrients and has produced strongly acid conditions in many of the sandy soils. It also carries the less soluble fine particles downward. Consequently, many of the soils acted upon by these climatic conditions are sandy, have low organic-matter content, low natural fertility, and have a low available water capacity.

Time

Time is important in the formation of soils. If all other factors of soil formation are equal, the degree of soil formation is directly proportional to time. Geologically, a long time is required for well-defined, genetically related horizons to form in a soil.

Soils that form in material resistant to weathering require more time to reach a particular stage of formation than do soils formed in easily weathered material. The translocation of fine particles within the soils to form the various horizons varies under different conditions. Most of the soil-forming processes, however, require a relatively long period of time. Almost pure quartz sand, which is highly resistant to weathering, is the dominant soil material in Brevard County. The finer textured silts and clays are the product of weathering.

In terms of geological time, relatively little time has elapsed since the material in whch the soils in Brevard County formed was laid down or emerged from the sea. The sandy loam and sandy clay loam horizons in some soils formed in place through processes of clay translocation. Some soils have distinct genetic horizons, for example, an accumulation of organic matter in a layer of sand and a thick black surface layer.

Relief

Relief has affected the formation of soils in the county mainly through its influence on soil-water relationships. Other factors of soil formation normally associated with relief, such as erosion, temperature, and plant cover, are of less importance.

Five general topographic features characterize the county: (1) the marshlands along the St. Johns River form part of the river channel when the river is at flood stage and generally are not higher than 20 feet above sea level; (2) a prairie zone adjacent to the river marsh and frequently flooded; (3) a pine flatwoods area, between the prairie and the Atlantic Coastal Ridge and west of the prairie in the southern part of the county, where the water table fluctuates, but is generally high and the elevation ranges to about 52 feet above sea level; (4) the Atlantic Coastal Ridge that has dunelike ridges and intervening swales; and (5) the barrier islands, a system of beach ridges and intervening sloughs that generally parallel the present islands. The Atlantic Coastal Ridge is the highest and most sloping area in the county and ranges from sea level to 55 feet above sea level. The barrier islands range from sea level to 20 feet above sea level along the crests of the beach ridges.

In each of the five general areas the formation of soils is influenced by relief and its relationship to depth of the water table. For example, St. Lucie soils on the coastal ridges are deep over a water table, low in organic-matter content, and highly leached. Myakka soils in the pine flatwoods have a high water table, are periodically wet, and have organic cemented layers. Pompano soils in the prairie zone are wet most of the time and have thin surface soil that is low in organic-matter content. Anclote soils in the low river marsh have a thick surface layer high in organic-matter content and a high water table most of the time. These soils formed in the same parent material, but differ in organic-matter content according to the degree of wetness and differing positions on the landscape.

Parent material

The parent material of most of the soils of Brevard County is unconsolidated marine sediments of the Pleistocene and Recent geological ages. The thickness of the Pleistocene material ranges from less than 20 feet to more than 200 feet (*7*). Most of this material is inert or very low in weatherable minerals. Below this layer are stratified beds of fine sand, sandy clay loam, shell fragments, and marly sandy clay loam that were deposited during the Pliocene age. They are exposed or near enough to the surface to affect soils in some places. Windblown sands, sea-deposited sandy and shelly material, and organic-matter accumulations of Recent times are parent materials for some soils.

Myakka and Immokalee soils are representative of the soils that formed in thick beds of loose sands. Eau Gallie and Oldsmar soils formed an argillic horizon by translocation of clayey materials in stratified sediments. Such soils as Winder soils formed in exposed Pliocene material. Astatula, Paola, and St. Lucie soils formed in Recent windblown quartz sands on the Atlantic Coastal Ridge. Palm Beach and Canaveral soils formed in sand and shell material of Recent sea deposits on the islands. Montverde, Micco, and other organic soils formed in recent accumulations of organic material in low wet places.

Processes of Soil Formation

The processes involved in the formation of soil horizons are accumulation of organic matter, leaching of calcium carbonates and bases, reduction and transfer of iron, and formation and translocation of silicate clay materials. In the formation of most soils in the county more than one of these processes have been active.

Most soils have three main horizons—A, B, and C. In many young sandy soils a B horizon has not formed.

The A horizon is the surface layer. It can be either the horizon of maximum organic-matter content, called the A1 horizon, or the horizon of maximum leaching of soluble or suspended materials, called the A2 horizon, or the subsurface layer.

The B horizon lies immediately below the A horizon and is called the subsoil. It is the horizon of maximum accumulation of dissolved or suspended materials, such as organic matter, iron, or clay. The B horizon generally is firmer than horizons immediately above and below and in places has a blocky structure.

The C horizon is the substratum. It has been very little affected by the soil-forming processes, but can be somewhat modified by weathering.

Some organic matter has accumulated in the surface layers of all soils in the county to form an A1 horizon. In many places this horizon has been mixed with material from underlying horizons through cultivation. The content of organic matter varies in the different soils and ranges from low to high, as stated in the preceding discussion of the effects of relief and wetness.

Leaching of carbonates and bases has occurred in nearly all the soils. The leaching of bases in soils generally precedes translocation of silicate clay materials.

Most of the soils in the county are leached to varying degrees, and this has contributed to the development of horizons.

The process of chemical reduction and transfer of iron, or gleying, is evident in some part of most of the soils in Brevard County, except for dry soils at higher elevations. Gleying is caused by wetness. The gray color in the subsoil horizons and grayish mottles in other horizons indicate the reduction and loss of iron in many soils. In some sandy soils, however, the sand grains are gray. Some horizons contain reddish-brown mottles and concretions, which indicate the segregation of iron.

The translocation of clay, organic matter, or iron oxides has contributed to horizon development in some of the soils of this county. Movement of clay, organic matter, or iron is evident in many of the soils, for example, a light-colored, leached A2 horizon; a B2 horizon in which sand grains are bridged and coated with clay, organic matter, or iron oxides; or a few patchy clay films on ped faces and in root channels. Some soils also have a thin B1 horizon that is intermediate in texture between the A2 and B2t horizons. Compared with the other processes involved in soil formation, the translocation of silicate clays may be of minor importance in the formation of horizons in the soils of Brevard County.

Classification of the Soils

The purpose of soil classification is to help us remember the significant characteristics of soils, to assemble our knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles relating to their behavior and to their response to manipulation. First through classification and then through the use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The current system of soil classification (*9*, *12*) was adopted by the Cooperative Soil Survey in 1965. It is a comprehensive system, designed to accommodate all soils. In this system classes of soils are defined in terms of observable or measurable properties. The properties chosen are mainly those that result in soil groups of similar genesis, or mode of origin. Genesis does not, however, appear in the definitions of the classes.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. Table 11 shows the classification of the soils of Brevard County according to this system. Brief descriptions of the six categories follow.

Order.—Ten soil orders are recognized: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these orders are those that tend to give broad climatic groupings of soils. Two exceptions to this generalization are the Entisols and the Histosols. both of which occur in many different climates. Five of the ten orders are represented in Brevard County: Alfisols, Spodosols, Mollisols, Histosols, and Entisols.

Suborder.—Each order is divided into suborders, mainly on the basis of soil characteristics that result in grouping soils according to genetic similarity. The climatic range of a suborder is narrower than that of an order. The properties used are mainly those that reflect either the presence or absence of waterlogging or differences in climate or vegetation.

Great group.—Each suborder is divided into great groups on the basis of similarity in the kind and sequence of the major horizons and in major soil properties. The horizons considered are those in which clay, iron, or humus have accumulated or those in which pans interfere with the growth of roots and the movement of water. The properties of a great group are soil temperature, chemical composition (mainly content of calcium, magnesium, sodium, and potassium), and the like.

Subgroup.—Each great group is divided into subgroups. One subgroup represents the central (typic) concept of the group; and others, called intregrades, have one or more properties of another great group, suborder, or order.

Family.—Families are established within each subgroup, mainly on the basis of properties important to the growth of plants or properties significant in engineering. Texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence are among the properties considered.

Series.—A series is a group of soils that have horizons that are similar in all important characteristics, except in texture of the surface layer, and are similar in arrangement in the profile. (See also the section "How This Survey Was Made.")

Physical, Chemical, and Clay Mineralogical Analysis [5]

Tables 12 and 13 show the physical, chemical, and clay mineralogical properties of representative soils in the county. Additional information, including bulk densities and moisture characteristics, for some soils is given in table 14.

Soil samples were collected from pits at sites selected for each of the more important soils in the survey area. The samples were air-dried, rolled or crushed, and sieved through a 2-millimeter screen. Data in the tables were obtained by standard methods of the soil survey laboratory or as described in "Methods of Soil Analysis" by the American Society of Agronomy (*2*). Particle-size distribution of soils shown in table 12 was made by the hydrometer method after dispersion and shaking with sodium hexametaphosphate (*5*). The sand fractions were obtained by dry sieving through a nest of sieves for at least 15 minutes. They are expressed on an ovendry weight basis. The percentage of silt was determined by adding the percentage of sand and clay and subtracting from 100. The textures given in this section do not necessarily agree with textures that were estimated in the field and described in the section "Descriptions of the Soils."

Soil reaction (pH) as shown in table 13, was determined on mixtures of soil and water at a ratio of 1:1 and in 1 N KCl, using a Beckman Zeromatic pH meter.

[5] By Dr. R. E. Caldwell and Dr. V. W. Carlisle, professor and associate professor of Soil Science, University of Florida Agricultural Experiment Stations.

TABLE 11.—*Classification of soils according to the current system of classification*

[The classifications given in this table were current at the time this survey was written in May, 1972. Since that time, changes and/or additions in the taxonomy have resulted in minor overlapping of some subgroups]

Series	Family	Subgroup	Order
Anclote	Sandy, siliceous, hyperthermic	Typic Haplaquolls	Mollisols.
Astatula	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Basinger	Siliceous, hyperthermic	Spodic Psammaquents	Entisols.
Bradenton shallow variant.	Fine-loamy, mixed, hyperthermic	Typic Ochraqualfs	Alfisols.
Canaveral	Mixed, hyperthermic	Aquic Udipsamments	Entisols.
Canova	Fine-loamy, siliceous, hyperthermic	Typic Glossaqualfs	Alfisols.
Chobee	Fine-loamy, mixed, hyperthermic	Typic Argiaquolls	Mollisols.
Cocoa	Sandy, siliceous, hyperthermic	Psammentic Hapludalfs	Alfisols.
Copeland	Fine-loamy, mixed, hyperthermic	Typic Argiaquolls	Mollisols.
Eau Gallie	Sandy, siliceous, hyperthermic	Alfic Haplaquods	Spodosols.
Felda	Loamy, siliceous, hyperthermic	Arenic Ochraqualfs	Alfisols.
Floridana	Loamy, siliceous, hyperthermic	Arenic Argiaquolls	Mollisols.
Galveston	Mixed, hyperthermic	Typic Udipsamments	Entisols.
Holopaw	Loamy, siliceous, hyperthermic	Grossarenic Ochraqualfs	Alfisols.
Immokalee	Sandy, siliceous, hyperthermic	Arenic Haplaquods	Spodosols.
Malabar	Loamy, siliceous, hyperthermic	Arenic Ochraqualfs	Alfisols.
Micco	Loamy, siliceous, dysic, hyperthermic	Terric Medifibrists	Histosols.
Montverde	Euic, hyperthermic	Typic Medifibrists	Histosols.
Myakka	Sandy, siliceous, hyperthermic	Aeric Haplaquods	Spodosols.
Oldsmar	Sandy, siliceous, hyperthermic	Alfic Arenic Haplaquods	Spodosols
Orsino	Hyperthermic, uncoated	Spodic Quartzipsamments	Entisols.
Palm Beach	Carbonitic, hyperthermic	Typic Udipsamments	Entisols.
Paola	Hyperthermic, uncoated	Spodic Quartzipsamments	Entisols.
Parkwood moderately fine subsoil variant.	Fine-loamy, mixed, hyperthermic	Mollic Ochraqualfs	Alfisols.
Pineda	Loamy, siliceous, hyperthermic	Arenic Ochraqualfs	Alfisols.
Pineda dark surface variant.	Loamy, siliceous, hyperthermic	Arenic Argiaquolls	Mollisols.
Pomello	Sandy, siliceous, hyperthermic	Arenic Haplohumods	Spodosols.
Pompano	Siliceous, hyperthermic	Typic Psammaquents	Entisols.
Satellite	Hyperthermic, uncoated	Aquic Quartzipsamments	Entisols.
St. Johns	Sandy, siliceous, hyperthermic	Typic Haplaquods	Spodosols.
St. Lucie	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Tavares	Hyperthermic, uncoated	Typic Quartzipsamments	Entisols.
Terra Ceia	Euic, hyperthermic	Typic Medisaprists	Histosols.
Tomoka	Loamy, siliceous, dysic, hyperthermic	Terric Medisaprists	Histosols.
Valkaria	Siliceous, hyperthermic	Spodic Psammaquents	Entisols.
Wabasso	Sandy over loamy, siliceous, hyperthermic	Alfic Haplaquods	Spodosols.
Welaka	Hyperthermic, uncoated	Spodic Quartzipsamments	Entisols.
Winder	Fine-loamy, siliceous, hyperthermic	Typic Glossaqualfs	Alfisols.

TABLE 12.—*Particle-size analysis of selected soils*

[Analyzed by Soil Characterization Laboratory, Agricultural Experiment Stations, Gainesville, Fla.]

Soil series and sample number	Horizon	Depth	Particle-size distribution							Textural class
			Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	
Anclote:										
S67–Fla 5–9–1	A11	0.4	0.1	2.7	22.4	57.4	2.4	11.6	3.4	Loamy fine sand.
S67–Fla 5–9–2	A12	4.10	0.1	2.8	23.9	57.0	2.2	10.4	3.6	Loamy fine sand.
S67–Fla 5–9–3	A13	10–19	0.2	4.3	29.4	58.8	2.0	2.9	2.4	Fine sand.
S67–Fla 5–9–4	C1	19–23	0.2	4.4	30.4	59.6	2.0	2.1	1.3	Fine sand.
S67–Fla 5–9–5	C2	23–62	0.2	5.4	29.0	58.4	2.0	1.9	3.1	Fine sand.
S67–Fla 5–9–6	C3	62–72	0.2	4.4	28.6	58.5	1.7	1.7	4.9	Fine sand.
Astatula:										
S67–Fla 5–24–1	A1	0–5	0.1	0.2	1.2	89.3	3.2	3.4	2.6	Fine sand.
S67–Fla 5–24–2	C1	5–14	0	0.1	0.7	90.3	3.9	2.2	2.8	Fine sand.
S67–Fla 5–24–3	C2	14–18	0	0	0.9	91.0	3.1	2.3	2.7	Fine sand.
S67–Fla 5–24–4	C3	18–48	0	0	0.7	92.6	2.8	1.2	2.7	Fine sand.
S67–Fla 5–24–5	C4	48–75	0	0	0.6	92.3	3.2	1.1	2.8	Fine sand.
Basinger:										
S67–Fla 5–16–1	A11	0–2	0.3	6.2	27.6	54.5	3.5	6.7	1.2	Fine sand.
S67–Fla 5–16–2	A12	2–8	0.2	6.6	28.3	54.9	4.2	4.1	1.7	Fine sand.
S67–Fla 5–16–3	A2	8–20	0.3	7.0	27.5	58.3	4.3	2.4	0.2	Fine sand.
S67–Fla 5–16–4	C&Bh	20–27	0.5	8.2	27.7	53.3	3.6	3.0	3.7	Fine sand.
S67–Fla 5–16–5	C1	27–40	0.5	7.7	26.8	52.6	3.7	3.6	5.1	Fine sand.
S67–Fla 5–16–6	C2	40–80	0.7	10.2	30.3	49.8	3.0	1.5	4.5	Sand.
Bradenton shallow variant:										
S67–Fla 5–28–1	Ap	0–5	0.1	0.3	1.2	67.1	19.7	8.9	2.7	Fine sand.
S67–Fla 5–28–2	A2	5–15	0.1	0.4	0.9	71.9	20.6	4.8	1.3	Fine sand.
S67–Fla 5–28–3	B21tg	15–18	0.3	0.4	0.7	49.3	21.1	8.0	20.2	Sandy clay loam.
S67–Fla 5–28–4	B22tg	18–25	2.0	2.5	2.2	44.6	18.9	11.0	18.8	Sandy loam.
S67–Fla 5–28–5	Cca	25–31	7.4	7.9	6.0	37.3	17.8	13.8	9.8	Sandy loam.
	R	31								
Cocoa:										
S67–Fla 5–25–1	Ap	0–6	0.5	13.1	32.8	44.6	2.8	3.2	3.0	Sand.
S67–Fla 5–25–2	A2	6–16	0.6	14.9	33.7	43.8	2.7	2.2	2.1	Sand.
S67–Fla 5–25–3	A3	16–22	0.6	12.4	30.4	48.2	3.4	3.2	1.8	Sand.
S67–Fla 5–25–4	B2t	22–28	0.5	11.6	29.4	47.5	2.9	1.9	6.2	Sand.
	IIR	28								
EauGallie:										
S67–Fla 5–8–1	A11	0–5	0	2.3	24.5	61.8	3.6	6.0	1.8	Fine sand.
S67–Fla 5–8–2	A12	5–10	0	1.7	22.1	68.1	4.1	3.3	0.7	Fine sand.
S67–Fla 5–8–3	A21	10–16	0.1	1.7	20.1	70.4	4.7	2.8	0.2	Fine sand.
S67–Fla 5–8–4	A22	16–19	0.1	2.3	18.9	70.7	4.7	2.7	0.6	Fine sand.
S67–Fla 5–8–5	A23	19–22	0.1	2.2	18.8	70.0	4.8	3.2	0.9	Fine sand.
S67–Fla 5–8–6	B21h	22–27	0	2.3	18.1	67.0	4.5	4.2	3.9	Fine sand.
S67–Fla 5–8–7	B22h	27–30	0	2.2	18.3	67.6	4.5	3.6	3.8	Fine sand.
S67–Fla 5–8–8	B23h	30–35	0	2.3	18.9	67.7	4.3	4.2	2.6	Fine sand.
S67–Fla 5–8–9	B3	35–40	0	2.3	17.7	70.5	4.5	3.4	1.6	Fine sand.
S67–Fla 5–8–10	A'2g	40–45	0.1	2.5	18.7	70.0	4.5	3.2	1.0	Fine sand.
S67–Fla 5–8–11	B'2tg	45–65	0	2.0	15.8	56.3	4.1	4.4	17.4	Fine sandy loam.
S67–Fla 5–8–12	C	65–93	0	2.5	20.0	51.3	2.2	5.6	18.4	Fine sandy loam.

TABLE 12.—*Particle-size analysis of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Particle-size distribution: Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Textural class
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	
Felda:										
S67–Fla 5–5–1	A1	0–6	0.5	11.6	37.6	35.7	4.7	7.3	2.6	Sand.
S67–Fla 5–5–2	A21	6–13	0.7	12.5	39.5	36.2	4.9	3.9	2.3	Sand.
S67–Fla 5–5–3	A22	13–20	0.7	14.5	44.0	31.4	3.7	3.6	2.1	Sand.
S67–Fla 5–5–4	A23	20–25	0.7	13.4	40.6	34.2	4.3	3.7	3.1	Sand.
S67–Fla 5–5–5	B21tg	25–36	0.8	11.6	31.9	28.6	3.7	4.2	19.2	Sandy loam.
S67–Fla 5–5–6	B22tg	36–41	0.8	11.9	32.4	27.4	4.9	4.0	18.6	Sandy loam.
S67–Fla 5–5–7	Cg	41–60	1.0	11.4	30.2	28.1	5.7	11.0	12.6	Sandy loam.
Holopaw:										
S69–Fla 5–41–1	A11	0–2	0.2	2.7	21.2	62.1	3.0	7.8	3.0	Fine sand.
S69–Fla 5–41–2	A12	2–7	0.3	5.2	26.0	61.5	2.6	2.9	1.5	Fine sand.
S69–Fla 5–41–3	A21g	7–18	0.5	5.7	25.3	60.6	2.8	2.8	2.3	Fine sand.
S69–Fla 5–41–4	A22g	18–35	0.7	6.0	23.4	62.0	2.8	4.0	1.1	Fine sand.
S69–Fla 5–41–5	A23g	35–45	0.8	6.3	22.8	61.0	2.9	3.3	2.9	Fine sand.
S69–Fla 5–41–6	B2tg	45–58	1.0	6.6	21.0	52.5	1.9	2.6	14.4	Fine sandy loam.
S69–Fla 5–41–7	B3g	58–62	0.6	5.4	21.2	50.1	2.0	4.5	16.2	Fine sandy loam.
S69–Fla 5–41–8	Cg	62–71	0.8	5.2	26.0	52.6	2.5	3.1	9.8	Loamy fine sand.
Myakka:										
S67–Fla 5–6–1	A1	0–5	0.1	9.7	51.8	29.3	1.2	6.3	1.6	Sand.
S67–Fla 5–6–2	A21	5–14	0.1	5.5	46.0	42.7	2.0	3.3	0.4	Sand.
S67–Fla 5–6–3	A22	14–26	0.1	5.6	40.8	48.0	2.4	2.8	0.3	Sand.
S67–Fla 5–6–4	B21h	26–30	0.2	6.6	39.5	40.3	1.9	5.9	5.6	Sand.
S67–Fla 5–6–5	B22h	30–34	0.2	6.4	38.0	41.5	2.0	5.8	6.2	Sand.
S67–Fla 5–6–6	B23h	34–39	0.2	7.4	41.1	40.6	1.7	3.1	5.9	Sand.
S67–Fla 5–6–7	B3	39–59	0.2	8.2	46.0	35.6	1.4	2.6	6.0	Sand.
Palm Beach:										
S69–Fla 5–35–1	A1	0–3	1.8	30.3	43.5	18.2	0.7	3.1	2.4	Coarse sand.
S69–Fla 5–35–2	AC	3–15	2.1	35.5	42.8	14.8	0.7	2.4	1.7	Coarse sand.
S69–Fla 5–35–3	C1	15–24	0.7	11.2	42.4	41.6	0.9	1.3	1.9	Sand.
S69–Fla 5–35–4	C2	24–27	3.4	19.2	44.8	29.0	0.7	1.2	1.7	Sand.
S69–Fla 5–35–5	C3	27–32	3.8	29.4	37.4	25.8	0.7	1.1	1.8	Coarse sand.
S69–Fla 5–35–6	C4	32–54	0.6	14.1	58.2	24.3	0.5	0.6	1.7	Sand.
S69–Fla 5–35–7	C5	54–105	22.0	35.6	10.8	25.3	2.5	1.8	2.0	Coarse sand.
Paola:										
S66–Fla 5–2–1	A1	0–5	0.3	7.1	33.6	48.0	8.2	1.8	1.0	Sand.
S66–Fla 5–2–2	A2	5–24	0.5	7.6	33.9	47.9	8.3	1.6	0.2	Sand.
S66–Fla 5–2–3	B2	24–48	0.6	6.1	28.0	54.3	7.2	1.5	2.3	Fine sand.
S66–Fla 5–2–4	B3	48–60	1.5	9.0	28.4	51.0	8.3	0	1.8	Fine sand.
S66–Fla 5–2–5	C	60–90	0.9	11.1	30.4	43.9	11.9	0	1.8	Sand.
Parkwood moderately fine subsoil variant:										
S69–Fla 5–47–1	Ap	0–7	0.2	0.5	2.1	63.2	21.4	7.0	5.6	Fine sand.
S69–Fla 5–47–2	A12	7–11	0.2	0.5	1.9	68.2	22.1	3.8	3.3	Fine sand.
S69–Fla 5–47–3	B2tgca	11–17	0.4	0.7	1.8	47.9	18.0	7.4	23.8	Sandy clay loam.
	R	17								
Pineda:										
S67–Fla 5–17–1	Ap	0–6	0.2	8.3	43.9	39.4	2.1	4.3	1.8	Sand.
S67–Fla 5–17–2	A12	6–9	0.4	11.9	44.6	37.8	1.5	2.4	1.4	Sand.
S67–Fla 5–17–3	A2	9–13	0.4	9.5	41.7	41.3	3.3	3.3	0.5	Sand.
S67–Fla 5–17–4	B2ir	13–19	0.6	11.8	44.9	37.0	1.8	2.0	1.9	Sand.
S67–Fla 5–17–5	B31ir	19–21	0.5	10.8	41.9	37.0	2.3	4.9	2.6	Sand.
S67–Fla 5–17–6	B32ir	21–23	0.4	10.4	42.2	37.9	2.0	3.9	3.2	Sand.
S67–Fla 5–17–7	A′2	23–33	0.4	9.3	40.6	39.9	2.8	4.4	2.6	Sand.
S67–Fla 5–17–8	B′2tg	33–47	0.7	12.0	36.0	29.6	1.1	3.2	17.4	Sandy loam.
S67–Fla 5–17–9	C1g	47–55	0.8	12.8	35.6	31.2	1.8	4.2	13.6	Sandy loam.
S67–Fla 5–17–10	C2g	55–65	1.8	13.6	33.0	30.5	2.5	4.0	14.[illegible]	Sandy loam.

TABLE 12.—*Particle-size analysis of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Particle-size distribution: Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Textural class
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	
Pompano:										
S69–Fla 5–48–1	A11	0–2	0.1	6.2	36.5	46.1	2.9	5.9	2.3	Sand.
S69–Fla 5–48–2	A12	2–7	0.2	7.2	36.1	47.7	3.2	3.6	2.0	Sand.
S69–Fla 5–48–3	C1	7–12	0.2	8.3	39.2	44.6	3.0	3.6	1.1	Sand.
S69–Fla 5–48–4	C2	12–19	0.2	8.4	40.4	45.7	2.4	1.7	1.2	Sand.
S69–Fla 5–48–5	C3	19–22	0.3	8.8	38.4	41.1	3.0	3.7	4.7	Sand.
S69–Fla 5–48–6	C4	22–30	0.3	8.9	38.5	43.4	3.1	2.7	3.1	Sand.
S69–Fla 5–48–7	C5	30–50	0.5	11.1	41.5	40.0	2.3	1.7	2.9	Sand.
S69–Fla 5–48–8	C6	50–65	0.6	11.2	43.5	38.2	2.0	1.1	3.4	Sand.
St. Lucie:										
S67–Fla 5–27–1	A	0–3	0	1.6	21.4	72.7	1.2	2.6	0.5	Fine sand.
S67–Fla 5–27–2	C1	3–36	0	2.3	22.2	72.8	1.1	1.4	0.2	Fine sand.
S67–Fla 5–27–3	C2	36–130	0	2.2	20.1	74.7	1.2	1.6	0.2	Fine sand.
Tavares:										
S67–Fla 5–11–1	Ap	0–6	0.1	0.1	1.2	87.4	4.5	3.7	3.0	Fine sand.
S67–Fla 5–11–2	A1	6–11	0	0	1.0	89.2	4.4	3.3	2.1	Fine sand.
S67–Fla 5–11–3	C1	11–15	0	0	1.0	89.8	4.5	2.3	2.4	Fine sand.
S67–Fla 5–11–4	C2	15–23	0	0	0.8	90.1	4.5	2.0	2.6	Fine sand.
S67–Fla 5–11–5	C3	23–39	0	0	0.8	90.1	4.6	2.0	2.5	Fine sand.
S67–Fla 5–11–6	C4	39–80	0	0	0.8	90.5	4.7	1.9	2.1	Fine sand.
Valkaria:										
S67–Fla 5–10–1	A11	0–5	0	3.2	26.2	60.8	2.9	4.7	2.2	Fine sand.
S67–Fla 5–10–2	A12	5–9	0.1	3.6	28.8	60.9	2.5	2.9	1.2	Fine sand.
S67–Fla 5–10–3	A2	9–15	0.1	3.6	29.7	60.9	2.3	2.4	1.0	Fine sand.
S67–Fla 5–10–4	B1ir	15–21	0.1	3.7	30.4	59.7	2.4	2.7	1.0	Fine sand.
S67–Fla 5–10–5	B2ir	21–28	0.1	4.1	28.8	59.3	2.2	2.5	3.0	Fine sand.
S67–Fla 5–10–6	B31ir	28–32	0.1	4.0	27.7	59.8	2.0	1.4	5.0	Fine sand.
S67–Fla 5–10–7	B32ir	32–41	0.2	4.0	28.4	60.3	1.8	1.6	3.7	Fine sand.
S67–Fla 5–10–8	C1	41–80	0.2	4.3	29.1	58.0	1.8	0.8	5.8	Fine sand.
Welaka:										
S66–Fla 5–23–1	A1	0–3	0.1	10.7	61.3	25.0	0.3	1.9	0.7	Sand.
S66–Fla 5–23–2	A2	3–18	0.1	11.0	61.9	25.4	0.5	1.0	0.1	Sand.
S66–Fla 5–23–3	B21ir	18–28	0.1	12.1	58.6	27.4	0.4	0.8	0.6	Sand.
S66–Fla 5–23–4	B22ir	28–43	0.1	12.7	58.3	26.4	0.4	0.7	1.4	Sand.
S66–Fla 5–23–5	B23ir	43–55	0.1	15.1	57.8	24.7	0.4	0.6	1.3	Sand.
S66–Fla 5–23–6	IIC1	55–59	2.6	31.5	51.5	12.2	0.4	0.8	1.0	Sand.
S66–Fla 5–23–7	IIC2	59–80	9.5	33.6	33.3	11.8	1.3	5.7	4.8	Coarse sand.

TABLE 13.—*Chemical and clay mineralogical*

[Analyzed by Soil Characterization Laboratory, Florida Agricultural Experiment Stations, Gainesville, Fla. The symbol <

Soil series and sample numbers	Horizon	Depth	pH		Cation-exchange capacity	Extractable cations (meq. per 100 grams of soil)	
			H_2O 1:1	KCl 1*N*		Calcium	Magnesium
Anclote:		*Inches*					
S67–Fla 5–9–1	A11	0–4	5. 4	5. 1	11. 5	6. 5	4. 0
S67–Fla 5–9–2	A12	4–10	5. 6	4. 8	10. 2	4. 5	2. 1
S67–Fla 5–9–3	A13	10–19	6. 1	6. 0	3. 5	2. 3	1. 0
S67–Fla 5–9–4	C1	19–23	6. 3	5. 5	1. 1	1. 0	0. 5
S67–Fla 5–9–5	C2	23–62	6. 3	5. 1	1. 3	0. 8	0. 6
S67–Fla 5–9–6	C3	62–72	6. 6	4. 8	1. 5	1. 0	0. 7
Astatula:							
S67–Fla 5–24–1	A1	0–5	6. 4	6. 0	6. 8	4. 6	1. 4
S67–Fla 5–24–2	C1	5–14	5. 1	4. 2	2. 8	0. 8	0. 4
S67–Fla 5–24–3	C2	14–18	4. 7	4. 0	1. 9	0. 4	0. 2
S67–Fla 5–24–4	C3	18–48	4. 9	4. 3	1. 7	0. 3	0. 2
S67–Fla 5–24–5	C4	48–75	4. 8	4. 4	1. 2	0. 2	0. 2
Basinger:							
S67–Fla 5–16–1	A11	0–2	5. 2	4. 9	12. 4	4. 7	0. 7
S67–Fla 5–16–2	A12	2–8	5. 2	4. 5	3. 5	1. 3	0. 2
S67–Fla 5–16–3	A2	8–20	5. 7	5. 2	1. 0	0. 3	0. 1
S67–Fla 5–16–4	C&Bh	20–27	4. 8	4. 2	2. 2	0. 8	0. 2
S67–Fla 5–16–5	C1	27–40	5. 7	4. 9	2. 6	1. 3	0. 1
S67–Fla 5–16–6	C2	40–80	5. 8	4. 9	2. 6	1. 4	0. 6
Bradenton shallow variant:							
S67–Fla 5–28–1	Ap	0–5	6. 4	6. 2	8. 3	8. 9	2. 9
S67–Fla 5–28–2	A2	5–15	6. 5	6. 3	1. 2	1. 2	0. 5
S67–Fla 5–28–3	B21tg	15–18	7. 3	6. 8	16. 7	(2)	(2)
S67–Fla 5–28–4	B22tg	18–25	7. 9	7. 4	11. 8	(2)	(2)
S67–Fla 5–28–5	Cca	25–31	8. 2	7. 9	2. 9	(2)	(2)
	R	31					
Cocoa:							
S67–Fla 5–25–1	Ap	0–6	5. 9	5. 5	4. 2	2. 2	0. 8
S67–Fla 5–25–2	A2	6–16	5. 8	5. 2	2. 1	0. 8	0. 3
S67–Fla 5–25–3	A3	16–22	5. 6	4. 9	1. 9	0. 5	0. 2
S67–Fla 5–25–4	B2t	22–28	5. 6	4. 8	2. 8	1. 6	0. 3
	IIR	28					
Eau Gallie:							
S67–Fla 5–8–1	A11	0–5	3. 9	3. 4	9. 9	1. 4	0. 7
S67–Fla 5–8–2	A12	5–10	4. 2	3. 3	2. 2	0. 4	0. 2
S67–Fla 5–8–3	A21	10–16	4. 4	3. 6	1. 0	0. 3	0. 1
S67–Fla 5–8–4	A22	16–19	4. 7	4. 1	2. 2	1. 1	0. 2
S67–Fla 5–8–5	A23	19–22	5. 4	5. 0	3. 2	1. 3	0. 3
S67–Fla 5–8–6	B21h	22–27	6. 5	6. 1	9. 5	7. 7	0. 3
S67–Fla 5–8–7	B22h	27–30	7. 1	6. 6	6. 5	6. 2	0. 2
S67–Fla 5–8–8	B23h	30–35	7. 3	6. 9	3. 2	3. 7	0. 7
S67–Fla 5–8–9	B3	35–40	7. 5	7. 0	1. 6	1. 8	0. 7
S67–Fla 5–8–10	A'2g	40–45	7. 6	7. 0	0. 8	0. 9	0. 4
S67–Fla 5–8–11	B'2tg	45–65	7. 9	6. 8	10. 3	8. 3	0. 3
S67–Fla 5–8–12	C	65–93	7. 2	5. 8	10. 7	8. 7	3. 5
Felda:							
S67–Fla 5–5–1	A1	0–6	5. 4	6. 5	6. 5	5. 0	0. 5
S67–Fla 5–5–2	A21	6–13	6. 2	6. 9	1. 7	1. 9	0. 1
S67–Fla 5–5–3	A22	13–20	7. 9	8. 3	0. 9	3. 4	0. 3
S67–Fla 5–5–4	A23	20–25	7. 9	8. 2	1. 0	2. 6	0. 4
S67–Fla 5–5–5	B21tg	25–36	7. 5	6. 9	8. 4	16. 0	2. 6
S67–Fla 5–5–6	B22tg	36–41	7. 2	5. 2	10. 3	(2)	(2)
S67–Fla 5–5–7	Cg	41–60	8. 1	7. 6	5. 5	(2)	(2)

See footnotes at end of table.

analysis of selected soils

means less than, and the symbol > means greater than. Dashes indicate that no determination was made]

Extractable cations (meq. per 100 grams of soil)—Continued: Potassium	Extractable cations (meq. per 100 grams of soil)—Continued: Sodium	Extractable phosphorus	Organic matter	Total nitrogen	Soluble salts	Corrosion: Resistance	Corrosion: Potential	Mineralogy of $<2\mu$ fraction [1]
		p.p.m.	*Percent*	*Percent*	*p.p.m.*	*Ohms*		
0.3	3.6	3.2	14.8	0.6	4620	8.8	6.4	A1 Q3 K3
0.1	2.1	2.0	2.8	0.1	1540	8.2	4.8	A1 Q3 K3
0.1	2.1	1.1	1.6	0.1	1400	7.7	3.6	—
0	1.6	0.8	0.3	0	1120	6.0	1.8	A1 Q3 Go3
0	1.8	1.1	0.5	0.1	2100	8.9	9.4	A1 Q3 Go3
0	2.3	1.1	0.3	0	2212	8.6	8.1	—
0.2	0.4	5.0	0.6	0	196	3.4	0.6	A1 Q3 K3
0.1	0.5	5.4	0.3	0	<140	2.0	0.3	—
0.1	0.4	5.8	0.1	0	<140	2.4	0.3	A1 Q3 K3 V3
0.1	0.5	7.1	0.1	0	<140	1.0	0.1	—
0.1	0.5	3.8	0.1	0	<140	2.0	0.2	A1 Q3 K3 V3
0.2	0.6	10.8	6.2	0.2	1568	7.0	3.2	A2 Q1 K3 V3 O3
0	0.4	0.8	1.2	0	<140	2.2	0.3	A2 Q1 K3 V3 O3
0	0.3	0.5	0.1	0	<140	0.8	0.1	—
0	0.5	0.8	0.3	0	<140	1.4	0.2	A1 Q2 K3 V3 O3
0	0.4	2.2	0.5	0	796	7.3	3.8	A1 Q3 K2
0	0.3	6.8	0.4	0	392	7.2	3.4	A1 Q3 K2
0.2	0.5	60.3	4.9	0.2	196	4.8	1.0	A2 Q1 K3 V3
0.1	0.5	30.0	0.3	0	<140	2.2	0.3	—
0.8	1.1	60.2	0.8	0.1	<140	5.0	1.0	A2 Q3 K2 M3 C3 Mi3
0.8	2.6	27.4	0.4	0	<140	5.3	1.1	A2 Q3 K2 M3 C3 Mi3
0.5	2.6	14.4	0.3	0	<140	4.1	0.6	A1 Q3 K3 M3 V3 C3 Mi3
0.1	0.4	16.7	1.9	0.1	<140	3.3	0.6	A1 Q3 K3
0	0.4	8.6	0.3	0	<140	1.1	0.1	—
0	0.4	6.1	0.1	0	<140	1.1	0.1	A1 Q3 K3 V3
0.1	0.4	8.9	0.1	0	<140	2.2	0.2	A1 Q3 K3 V3
0.1	0.4	5.7	5.4	0.1	<140	2.4	0.3	A1 Q2
0	0.4	1.8	0.8	0	<140	1.4	0.1	—
0	0.3	1.3	0.6	0	<140	0.6	0.1	A2 Q1 O3
0	0.4	0.8	0.6	0	<140	0.8	0.1	A2 Q1 O3
0	0.4	1.0	0.7	0	<140	1.7	0.2	—
0	0.6	0.9	2.5	0	<140	2.8	0.7	A2 Q1 K3 O3 V3 Gi3
0	0.7	0.5	1.4	0	<140	3.2	0.6	A2 Q1 K3 O3 V3 Gi3
0	0.6	0.8	0.6	0	<140	2.0	0.3	A2 Q1 K3 O3 V3 Gi3
0	0.6	0.8	0.3	0	<140	2.7	0.2	A1 Q2
0	0.6	0.7	0.1	0	154	3.2	0.6	—
0.2	2.7	0.7	0.5	0	378	5.9	1.5	A1 Q3 K3 F3
0.3	3.1	1.3	0.5	0	1008	6.8	3.0	A1 K2 Mi3
0.1	0.7	2.4	4.4	0.2	336	5.3	1.4	A1 Q2 K3 C3
0	0.5	1.1	0.4	0	<140	2.5	0.2	A2 Q2 K2 C3
0	0.6	0.8	0.1	0	266	4.2	0.8	A2 Q2 K2 C3
0	0.7	0.7	0.1	0	392	5.8	1.4	—
0.1	1.3	0.4	0.2	0	658	6.6	2.4	A2 Q3 K2 C3 Go3 V3
0.1	1.5	0.6	0.4	0	868	7.6	4.1	A2 Q3 K2 C3 Go3 V3
0.4	7.9	1.1	0.3	0	812	7.0	2.5	A1 Q3 H2 Ca3

TABLE 13—*Chemical and clay mineralogical*

Soil series and sample numbers	Horizon	Depth	pH		Cation-exchange capacity	Extractable cations (meq. per 100 grams of soil)	
			H_2O 1:1	KCl 1*N*		Calcium	Magnesium
Holopaw:							
S67–Fla 5–41–1	A11	0–2	6. 0	5. 5	10. 3	5. 8	2. 8
S67–Fla 5–41–2	A12	2–7	6. 1	5. 7	3. 3	1. 5	0. 6
S67–Fla 5–41–3	A21g	7–18	6. 4	6. 1	1. 4	0. 6	0. 3
S67–Fla 5–41–4	A22g	18–35	6. 8	6. 4	1. 0	0. 6	0. 3
S67–Fla 5–41–5	A23g	35–45	6. 7	6. 4	0. 7	0. 7	0. 4
S67–Fla 5–41–6	B2tg	45–58	6. 8	6. 4	6. 7	2. 1	3. 4
S67–Fla 5–41–7	B3g	58–62	7. 1	6. 7	4. 1	1. 9	2. 0
S67–Fla 5–41–8	Cg	62–71	7. 2	6. 9	2. 9	3. 1	1. 6
Montverde:							
S67–Fla 5–14–1	Oi1	0–6	5. 1	4. 6	113. 8	58. 2	8. 6
S67–Fla 5–14–2	Oi2	6–16	5. 0	4. 7	64. 2	27. 2	5. 5
S67–Fla 5–14–3	Oi3	16–23	5. 0	4. 6	65. 2	23. 4	5. 0
S67–Fla 5–14–4	Oi4	23–45	5. 3	4. 8	66. 8	31. 8	5. 2
S67–Fla 5–14–5	Oe1	45–57	5. 1	4. 6	58. 4	29. 9	4. 8
S67–Fla 5–14–6	IIC1g	57–64	5. 6	4. 9	19. 0	6. 4	2. 3
S67–Fla 5–14–7	IIC2g	64–70	7. 1	6. 4	27. 2	17. 3	4. 2
Myakka:							
S67–Fla 5–6–1	A1	0–5	4. 1	3. 2	9. 3	1. 4	0. 8
S67–Fla 5–6–2	A21	5–14	4. 4	3. 9	1. 0	0. 3	0. 1
S67–Fla 5–6–3	A22	14–26	4. 6	3. 9	0. 9	0. 3	0. 1
S67–Fla 5–6–4	B21h	26–30	4. 3	3. 5	26. 8	6. 3	1. 0
S67–Fla 5–6–5	B22h	30–34	4. 4	3. 9	25. 2	5. 3	0. 8
S67–Fla 5–6–6	B23h	34–39	5. 3	4. 6	9. 5	3. 6	0. 6
S67–Fla 5–6–7	B3	39–59	6. 2	6. 0	3. 9	2. 5	0. 4
S67–Fla 5–6–8	C	59–75	------	------	------	------	------
Palm Beach:							
S67–Fla 5–35–1	A1	0–3	8. 2	7. 9	6. 1	113. 0	5. 2
S67–Fla 5–35–2	AC	3–15	8. 2	8. 1	0. 6	183. 9	3. 1
S67–Fla 5–35–3	C1	15–24	8. 1	8. 3	1. 1	172. 3	3. 0
S67–Fla 5–35–4	C2	24–27	8. 3	8. 4	0. 5	182. 8	3. 9
S67–Fla 5–35–5	C3	27–32	8. 3	8. 4	0. 5	184. 1	4. 5
S67–Fla 5–35–6	C4	32–54	8. 1	8. 4	0. 6	164. 7	3. 8
S67–Fla 5–35–7	C5	54–105	8. 8	8. 7	0. 7	190. 0	4. 3
Paola:							
S67–Fla 5–2–1	A1	0–5	4. 5	3. 7	4. 0	1. 1	0. 2
S67–Fla 5–2–2	A2	5–24	5. 5	4. 5	0. 3	0. 3	0
S67–Fla 5–2–3	B2	24–48	4. 9	4. 6	1. 4	0. 2	0
S67–Fla 5–2–4	B3	48–60	5. 3	4. 6	0. 6	0. 2	0
S67–Fla 5–2–5	C	60–90	5. 4	4. 7	0. 6	0. 2	0
Parkwood moderately fine subsoil variant:							
S67–Fla 5–2–1	Ap	0–7	7. 6	7. 2	11. 5	15. 8	2. 0
S67–Fla 5–2–2	A12	7–11	7. 6	7. 4	4. 7	(2)	(2)
S67–Fla 5–2–3	B2tgca	11–17	8. 3	8. 0	3. 0	(2)	(2)
	R	17					
Pineda:							
S67–Fla 5–17–1	Ap	0–6	5. 2	4. 5	2. 8	0. 7	0. 3
S67–Fla 5–17–2	A12	6–9	5. 4	4. 6	1. 1	0. 4	0. 1
S67–Fla 5–17–3	A2	9–13	5. 9	5. 8	0. 3	0. 4	0. 1
S67–Fla 5–17–4	B2ir	13–19	6. 3	6. 1	0. 3	0. 5	0. 1
S67–Fla 5–17–5	B31ir	19–21	6. 6	6. 5	0. 3	0. 6	0. 1
S67–Fla 5–17–6	B32ir	21–23	6. 7	6. 3	0. 4	0. 6	0. 2
S67–Fla 5–17–7	A'2	23–33	6. 7	6. 3	0. 6	0. 4	0. 21
S67–Fla 5–17–8	B'2tg	33–47	6. 9	6. 9	9. 2	6. 4	1. 4
S67–Fla 5–17–9	C1g	47–55	7. 4	7. 0	8. 1	(2)	(2)
S67–Fla 5–17–10	C2g	55–65	7. 8	7. 3	6. 8	(2)	(2)

See footnotes at end of table.

analysis of selected soils—Continued

Extractable cations (meq. per 100 grams of soil)—Continued		Extractable phosphorus	Organic matter	Total nitrogen	Soluble salts	Corrosion		Mineralogy of <2μ fraction [1]
Potassium	Sodium					Resistance	Potential	
0. 1	0. 4	2. 5	6. 9	0. 3	210	3. 0	0. 1	A1 Q2 K3
0	0. 3	0. 7	0. 8	0	<140	2. 1	0. 2	A1 Q2 K3
0	0. 3	0. 4	0. 3	0	<140	2. 6	0. 3	A1 Q2 K2
0	0. 3	0. 4	0. 3	0	448	6. 9	2. 4	A1 Q2 K2
0	0. 4	0. 3	0. 3	0	644	7. 6	3. 4	--------
0. 3	1. 2	0. 2	0. 5	0	966	7. 8	3. 8	A2 Q2 K3 C3 V3
0. 2	0. 9	0. 2	0. 4	0	--------	--------	--------	--------
0. 1	0. 6	0. 2	0. 2	0	--------	--------	--------	A2 Q3 K3 V/Mi3
0. 6	5. 0	23. 1	73. 6	3. 6	4200	7. 6	2. 5	--------
0. 5	4. 1	16. 0	76. 1	3. 9	2660	6. 7	1. 8	--------
0. 4	3. 7	10. 2	75. 8	3. 5	2240	6. 2	1. 7	--------
0. 3	3. 4	3. 0	70. 0	3. 2	2240	8. 0	3. 8	--------
0. 2	1. 8	5. 8	44. 8	1. 6	1148	7. 8	3. 3	A1 Q3
0. 1	0. 9	0. 4	3. 0	0. 2	602	8. 4	5. 0	--------
0. 2	1. 4	0. 3	1. 0	0. 1	490	8. 8	6. 2	A2 Q3 K2 M2
0. 1	0. 6	2. 5	7. 9	0. 1	154	3. 2	0. 5	A1 Q2
0	0. 4	1. 3	0. 4	0	<140	0. 8	0. 1	--------
0	0. 4	1. 0	0. 3	0	<140	1. 2	0. 1	--------
0	1. 0	0. 7	9. 6	0. 1	210	2. 6	0. 4	A1 Q1
0	1. 6	1. 1	7. 3	0. 1	238	4. 5	2. 0	--------
0	0. 9	1. 3	2. 4	0	196	3. 7	0. 6	A1 Q3 K3
0	0. 7	0. 8	0. 4	0	168	3. 7	0. 7	A1 Q3 K2
--------	--------	--------	--------	--------	--------	--------	--------	
0. 3	5. 5	27. 7	2. 5	0. 1	196	2. 8	0. 4	A1 Q2 K3
0. 3	5. 6	18. 1	0. 5	0	<140	1. 1	0. 1	A1 Q2 K3
0. 3	5. 7	13. 7	0. 2	0	<140	1. 1	0. 1	--------
0. 3	6. 1	14. 7	0. 2	0	<140	1. 3	0. 2	--------
0. 3	6. 5	15. 0	0. 1	0	<140	1. 0	0. 1	--------
0. 3	5. 7	15. 1	0. 1	0	<140	1. 0	0. 1	A1 Q2 V/Mi3
0. 3	7. 0	17. 0	0. 1	0	224	2. 8	0. 4	A1 Q2 V/Mi3
0. 1	0. 4	2. 6	2. 0	0	<140	1. 4	0. 2	A1 Q2
0	0. 4	0. 8	0. 1	0	<140	1. 8	0. 1	--------
0	0. 4	4. 5	0. 3	0	<140	1. 4	0. 2	A1 Q2 K3 V3 Gi3
0	0. 6	3. 2	0. 1	0	<140	0. 6	0. 1	--------
0	0. 6	2. 3	0	0	<140	0. 8	0. 1	A1 Q2 K3 V3 Gi3
0. 4	0. 7	74. 2	5. 0	0. 2	266	4. 0	0. 6	A2 Q2 M3 Mi3
0. 1	0. 5	31. 3	1. 4	0. 1	294	4. 2	0. 6	--------
0. 4	2. 7	10. 8	1. 3	0. 1	735	6. 2	1. 4	A2 Q2 M3 V/Mi3
0. 1	0. 4	0. 7	2. 2	0. 1	<140	3. 8	0. 7	A1 Q3 K3 Gi3
0	0. 3	0. 4	0. 6	0	<140	1. 0	0. 1	--------
0	0. 3	0. 3	0. 1	0	<140	1. 0	0. 1	--------
0	0. 3	0. 3	0. 1	0	<140	1. 8	0. 2	A3 Q3 K3 Go3 He3
0	0. 4	0. 3	0. 1	0	<140	1. 0	0. 2	--------
0	0. 4	0. 4	0. 1	0	<140	1. 3	0. 2	--------
0	0. 4	0. 3	0. 2	0	<140	2. 0	0. 3	A2 Q1 K3
0. 1	0. 9	0. 3	1. 0	0	518	7. 8	3. 5	A1 Q3 K3 Gi3
0. 1	0. 9	0. 4	0. 3	0	490	7. 2	2. 7	A1 Q3 K3
0. 4	7. 4	0. 3	0. 3	0	462	6. 7	2. 0	A1 Q3 K3

Table 13—*Chemical and clay mineralogical*

Soil series and sample numbers	Horizon	Depth	pH		Cation-exchange capacity	Extractable cations (meq. per 100 grams of soil)	
			H^2O 1:1	KCl 1*N*		Calcium	Magnesium
Pompano:							
S67-Fla 5-48-1	A11	0-2	6. 0	5. 6	5. 2	2. 9	0. 5
S67-Fla 5-48-2	A12	2-7	5. 6	5. 3	1. 9	1. 0	0. 2
S67-Fla 5-48-3	C1	7-12	5. 8	5. 5	0. 5	0. 4	0. 1
S67-Fla 5-48-4	C2	12-19	6. 2	5. 8	0. 3	0. 3	0. 1
S67-Fla 5-48-5	C3	19-22	6. 3	5. 9	2. 1	1. 0	0. 3
S67-Fla 5-48-6	C4	22-30	7. 1	6. 8	1. 1	0. 8	0. 3
S67-Fla 5-48-7	C5	30-50	7. 3	7. 1	0. 8	0. 6	0. 2
S67-Fla 5-48-8	C6	50-65	7. 4	7. 0	1. 6	1. 2	0. 2
St. Lucie:							
S67-Fla 5-27-1	A	0-3	5. 2	4. 7	1. 2	0. 8	0. 1
S67-Fla 5-27-2	C1	3-36	5. 7	5. 5	0. 3	0. 2	0. 1
S67-Fla 5-27-3	C2	36-130	6. 2	5. 8	0. 1	0	0
Tavares:							
S67-Fla 5-11-1	Ap	0-6	5. 7	5. 3	5. 3	3. 2	0. 2
S76-Fla 5-11-2	A1	6-11	5. 7	4. 8	3. 1	1. 3	0. 1
S67-Fla 5-11-3	C1	11-15	5. 6	4. 8	2. 0	0. 7	0
S67-Fla 5-11-4	C2	15-23	5. 5	4. 8	1. 3	0. 5	0. 1
S67-Fla 5-11-5	C3	23-39	5. 5	4. 8	0. 7	0. 4	0. 1
S67-Fla 5-11-6	C4	39-80	5. 2	4. 7	0. 4	0. 2	0
Terra Ceia:							
S67-Fla 5-12-1	Oa1	0-7	5. 8	5. 2	165. 3	86. 8	32. 5
S67-Fla 5-12-2	Oa2	7-26	6. 4	5. 8	166. 6	64. 4	27. 0
S67-Fla 5-12-3	Oa3	26-72	6. 8	6. 2	58. 6	54. 4	19. 1
S67-Fla 5-12-4	IIC	72-80	7. 3	6. 8	4. 2	2. 7	0. 9
Valkaria:							
S67-Fla 5-10-1	A11	0-5	5. 3	3. 8	3. 0	1. 5	0. 1
S67-Fla 5-10-2	A12	5-9	5. 7	4. 7	0. 8	0. 4	0
S67-Fla 5-10-3	A2	9-15	5. 8	5. 1	0. 4	0. 3	0
S67-Fla 5-10-4	B1ir	15-21	6. 2	5. 5	0. 3	0. 4	0
S67-Fla 5-10-5	B2ir	21-28	6. 1	5. 4	0. 6	0. 7	0
S67-Fla 5-10-6	B31ir	28-32	6. 7	6. 1	2. 0	1. 4	0. 1
S67-Fla 5-10-7	B32ir	32-41	6. 6	6. 0	1. 6	1. 0	0. 1
S67-Fla 5-10-8	C1	41-80	7. 1	6. 8	2. 4	1. 6	0. 2
Welaka:							
S67-Fla 5-23-1	A1	0-3	4. 2	3. 8	5. 6	1. 9	0. 3
S67-Fla 5-23-2	A2	3-18	5. 5	5. 2	1. 0	0. 3	0. 1
S67-Fla 5-23-3	B21ir	18-28	5. 7	5. 3	0. 8	0. 3	0. 1
S67-Fla 5-23-4	B22ir	28-43	5. 6	5. 2	0. 6	0. 2	0. 1
S67-Fla 5-23-5	B23ir	43-55	5. 8	5. 7	0. 5	2. 0	0. 2
S67-Fla 5-23-6	IIC1	55-59	8. 2	8. 5	0. 5	[2]	[2]
S67-Fla 5-23-7	IIC2	59-80	8. 4	8. 8	0. 2	[2]	[2]

[1] By Na_2CO_3—centrifuge method. A=amorphous, Q=quartz, K=kaolinite, M=montmorillonite, Mi=mica(illite), H=halloysite F=feldspar, C=chlorite, V=vermiculite, O=olivine; Gi=gibbsite, Go=goethite, He=hematite, Ca=calcite. Mineral abundance: 1 i

analysis of selected soils—Continued

Extractable cations (meq. per 100 grams of soil)—Continued		Extractable phosphorus	Organic matter	Total nitrogen	Soluble salts	Corrosion		Mineralogy of $<2\mu$ fraction [1]
Potassium	Sodium					Resistance	Potential	
0.1	0.5	8.7	4.1	0.2	490	5.6	1.1	A1,Q2K3,C3,
0	0.4	4.3	1.4	0.1	182	3.4	0.5	A1,Q2K3,C3,
0	0.3	0.6	0.4	0	<140	1.5	0.2	-----
0	0.3	0.4	0.1	0	<140	1.4	0.2	-----
0.1	0.5	0.3	0.1	0	140	1.6	0.2	-----
0	0.5	0.3	0.2	0	532	6.6	2.0	-----
0	0.4	0.4	0.2	0	630	7.6	3.0	-----
0	0.6	0.3	0.1	0	364	6.0	1.6	A2,Q3,K3,V3,C3
0	0.2	0.7	1.0	0	<140	1.0	0.1	A2,Q1,K3
0	0.2	0.5	0	0	<140	0.4	0	A2,Q2,K3,O3
0	0.2	1.0	0	0	<140	0.2	0	A2,Q2,K3,O3
0.6	0.5	19.2	2.6	0.1	168	3.9	0.8	A1,Q3,K2
0.1	0.5	20.6	0.8	0	<140	2.0	0.2	-----
0	0.4	14.4	0.6	0	<140	2.0	0.2	-----
0	0.4	12.5	0.3	0	<140	3.0	0.5	-----
0	0.4	9.7	0.1	0	<140	3.2	0.6	-----
0	0.6	46.8	0.2	0	<140	3.2	0.6	A1,Q2,K3,V3,C3
0.3	5.9	3.7	82.8	2.5	1820	7.6	3.2	-----
0.2	8.5	1.0	90.8	2.9	2520	8.8	>10.0	-----
0.3	12.4	1.9	83.9	2.6	10360	9.1	>10.0	-----
0	1.2	0.9	2.2	0.2	1708	-----	-----	-----
0	0.6	1.0	2.3	0.1	<140	3.3	0.6	A1 Q1 K3 C3
0	0.4	0.7	0.6	0	<140	1.2	0.2	A1 Q1 K3 C3
0	0.4	0.7	0.3	0	<140	1.0	0.2	A1 Q2 K2
0	0.6	0.9	0.2	0	<140	4.4	1.0	-----
0	0.4	0.7	0.2	0	<140	1.9	0.2	A1 Q2 K3 Go3 Gi3 He3
0	0.6	0.9	0.1	0	182	4.6	1.0	-----
0	0.6	1.0	0.1	0	196	4.4	1.0	A1 Q3 K3 Gi3
0	0.5	0.9	0.1	0	294	6.8	2.7	A1 Q3 K3 Gi3
0	0.4	1.2	2.1	0.1	<140	2.3	0.3	A1 Q3 K3
0	0.4	0.4	0.1	0	<140	1.0	0.1	-----
0	0.4	1.0	0.1	0	<140	0.6	0.1	-----
0	0.4	3.9	0	0	<140	0.6	0.1	A1 Q3 K3 Go3
0	0.4	5.1	0	0	<140	2.5	0.4	-----
0.2	3.7	83.2	0	0	168	4.0	0.7	A1 Q3 K3 Go3 He3
0.2	5.4	19.8	0	0	<140	2.4	0.3	A1 Q3 K3 Go3 He3

more than 40 percent, 2 is 10 to 40 percent, 3 is less than 10 percent.

[2] Carbonates of Ca or Mg, or both, are present.

TABLE 14.—*Bulk densities, hydraulic conductivities, and water-retaining properties of selected soils*

[Analyzed by Soil Characterization Laboratory, Florida Agricultural Experiment Station, Gainesville, Fla. Dashes indicate that no determination was made]

Soil series and sample number	Horizon	Depth	Bulk density	Hydraulic conductivity	Water content at various pressures (bars)			
					0.10	0.33	0.50	15.00
Anclote:		*Inches*	*G./cm.³*	*Cm./hr.*	*Pct. by vol.*	*Pct. by vol.*	*Pct. by vol.*	*Pct. by vol.*
S67-Fla 5-9-1	A11	0-4	0.83	50.9	33.9	27.7	24.9	6.5
S67-Fla 5-9-3	A13	10-19	1.57	11.6	11.0	6.7	5.8	1.4
Astatula:								
S67-Fla 5-24-1	A1	0-5	1.35	27.8	11.9	8.0	6.6	3.4
S67-Fla 5-24-2	C1	5-14	1.40	36.5	7.8	4.8	4.0	1.5
S67-Fla 5-24-3	C2	14-18	1.40	51.5	6.2	4.0	3.1	1.5
S67-Fla 5-24-4	C3	18-48	1.42	59.8	5.5	3.8	2.6	1.3
S67-Fla 5-24-5	C4	48-75	1.45	49.1	5.2	2.9	2.6	1.3
Basinger:								
S67-Fla 5-16-1	A11	0-2	1.28	79.5	----------	----------	9.8	----------
S67-Fla 5-16-2	A12	2-8	1.34	14.9	17.6	11.4	4.4	5.0
S67-Fla 5-16-3	A2	8-20	1.64	39.0	5.1	3.6	1.8	0.5
S67-Fla 5-16-4	C&Bh	20-27	1.71	5.9	12.6	8.2	3.3	2.2
S67-Fla 5-16-5	C1	27-40	1.66	13.2	10.6	6.8	4.6	2.2
Bradenton shallow variant:								
S67-Fla 5-28-1	Ap	0-5	1.21	25.1	20.3	13.5	10.9	7.4
S67-Fla 5-28-2	A2	5-15	1.47	10.6	16.6	11.6	5.7	4.8
S67-Fla 5-28-3	B21tg	15-18	1.52	3.9	32.4	28.1	27.9	13.4
Cocoa:								
S67-Fla 5-25-1	Ap	0-6	1.49	43.7	8.9	6.4	5.5	3.7
S67-Fla 5-25-2	A2	6-16	1.57	72.3	4.8	3.0	2.4	1.3
S67-Fla 5-25-3	A3	16-22	1.55	72.1	4.9	2.7	2.3	1.1
S67-Fla 5-25-4	B2t	22-28	1.59	82.1	5.1	3.5	3.2	1.8
Eau Gallie:								
S67-Fla 5-8-1	A11	0-5	1.05	20.7	----------	----------	9.6	----------
S67-Fla 5-8-2	A12	5-10	1.25	36.3	24.5	19.1	3.8	8.0
S67-Fla 5-8-4	A22	16-19	1.46	37.3	7.9	4.9	2.6	2.4
S67-Fla 5-8-6	B21h	22-27	1.66	4.7	22.5	17.7	16.8	3.5
S67-Fla 5-8-11	B'2tg	45-65	1.68	0.8	33.4	31.4	27.4	13.3
Felda:								
S67-Fla 5-5-1	A1	0-6	1.43	29.1	20.7	15.2	6.6	5.8
S67-Fla 5-5-2	A21	6-13	1.58	59.7	7.5	5.0	3.5	2.2
S67-Fla 5-5-3	A22	13-20	1.69	21.4	8.9	5.8	2.7	1.5
S67-Fla 5-5-5	B21tg	25-36	1.66	0.3	32.0	30.3	23.0	14.0
Myakka:								
S67-Fla 5-6-1	A1	0-5	1.09	69.7	29.3	24.1	10.8	7.5
S67-Fla 5-6-2	A21	5-14	1.43	77.1	----------	----------	2.7	2.4
S67-Fla 5-6-3	A22	14-26	1.58	50.2	5.4	4.2	2.3	2.3
S67-Fla 5-6-4	B21h	26-30	1.42	1.0	----------	----------	14.2	4.5
S67-Fla 5-6-5	B22h	30-34	1.32	2.4	24.0	22.7	13.9	6.3
Paola:								
S67-Fla 5-2-1	A1	0-5	1.21	127.3	8.8	7.3	5.8	4.0
S67-Fla 5-2-2	A2	5-24	1.43	98.9	3.9	3.2	2.0	2.2
S67-Fla 5-2-3	B2	24-48	1.49	91.5	6.5	4.4	3.0	1.9
S67-Fla 5-2-4	B3	48-60	1.48	51.4	4.6	2.4	1.4	1.0
S67-Fla 5-2-5	C	60-90	1.54	77.4	3.8	2.5	1.4	1.1
Pineda:								
S67-Fla 5-17-1	Ap	0-6	1.41	87.5	7.0	4.5	4.5	1.2
S67-Fla 5-17-2	A12	6-9	1.58	93.3	5.8	3.6	2.5	1.2
S67-Fla 5-17-4	B2ir	13-19	1.64	37.4	6.2	4.2	2.4	1.6
S67-Fla 5-17-7	A'2	23-33	1.69	8.4	7.6	4.9	3.4	1.2
St. Lucie:								
S67-Fla 5-27-1	A	0-3	1.42	69.5	5.0	4.1	3.6	2.0
S67-Fla 5-27-2	C1	3-36	1.50	57.6	3.7	2.9	2.5	2.1
S67-Fla 5-27-3	C2	36-130	1.54	63.1	3.1	2.4	1.9	1.7

TABLE 14.—*Bulk densities, hydraulic conductivities, and water-retaining properties of selected soils*—Continued

Soil series and sample number	Horizon	Depth	Bulk density	Hydraulic conductivity	Water content at various pressures (bars)			
					0.10	0.33	0.50	15.00
		Inches	*G./cm.³*	*Cm./hr.*	*Pct. by vol.*	*Pct. by vol.*	*Pct. by vol.*	*Pct. by vol.*
Tavares:								
S67–Fla 5–11–1	Ap	0–6	1.41	20.9	11.4	7.7	5.8	2.1
S67–Fla 5–11–2	A1	6–11	1.46	29.2	8.0	4.8	4.2	1.7
S67–Fla 5–11–4	C2	15–23	1.54	43.9	6.4	3.6	3.3	1.5
S67–Fla 5–11–5	C3	23–39	1.55	38.7	5.9	3.2	2.9	1.2
Terra Ceia:								
S67–Fla 5–12–1	Oa1	0–7	0.28	1.0	82.9	78.0	31.6	
S67–Fla 5–12–2	Oa2	7–26	0.16	6.5	75.6	63.0	27.2	
Valkaria:								
S67–Fla 5–10–1	A11	0–5	1.32	60.4	12.4	9.1	6.1	4.0
S67–Fla 5–10–3	A2	9–15	1.59	29.6	4.7	2.8	2.1	1.4
S67–Fla 5–10–5	B2ir	21–28	1.70	4.3	9.9	6.0	3.9	1.2

The cation exchange capacity was determined by direct distillation of adsorbed ammonia (*8*) and is expressed as milliequivalents per 100 grams of soil. Extractable cations of calcium, magnesium, potassium, and sodium were obtained using ammonium acetate buffered at pH 7.0 and a Beckman DU flame-spectrophotometer. Total acidity (extractable hydrogen plus aluminum) and percent base saturation were not calculated because these values did not seem to correlate well with pH. Unusually large amounts of sodium salts were in most soils. Values for extractable sodium presumed to be on the colloidal complex were thus inordinately high. This is also true for some of the calcium and magnesium values where the soil contains shell or where limestone is near the surface.

Extractable soil phosphorus was determined colorimetrically on extracts treated with ammonium molybdate and stannous chloride (*10*). Organic matter was determined by a modification of the Walkley-Black wet-combustion method (*3*). Total nitrogen was obtained by the macro-Kjeldahl method (*6*). Soluble salts were determined using specific conductance electrodes on water extracts, using soil-water ratios of 1:2 for mineral soils and 1:10 and 1:20 at times for organic soils. All results are reported as p.p.m. based on air-dry weights of soil. Resistance (R in ohms) was obtained using a Model 100 Corrosion Tester. The corrosion potential (C) was obtained from the manufacturer's tables that are directly related to the R values. The smaller the C value, the less the corrosion and the greater is the expectancy of pipe life. Generally C values range from 1 to 10 and pipe life ranges from 20 to 2 years.

In table 13, clay minerals were identified by X-ray diffraction and differential thermal analysis. A Norelco X-ray spectrometer equipped with a Geiger counter, chart recorder, and a copper target was used to analyze the preferentially oriented clay samples (less than 2 microns) in the form of thin films on glass slides. Diffractograms were obtained of the magnesium-saturated, glycerol-solvated, potassium-saturated, and heat-treated potassium-saturated clays. These diffractograms were obtained after the soils had been treated with hydrogen peroxide to remove organic matter and the free iron oxides had been removed by the sodium dithionite-citrate method (*2*). Thermograms were also run on the soil clays, using the Deltatherm Model D2000 and method as described by Barshad (*4*), to differentiate between certain clay minerals, such as kaolinite and halloysite, and to corroborate certain identifications.

Bulk density and hydraulic conductivity (saturated) were measured. See table 14. Water retention at 0.10 and 0.33 bars was measured on 3- by 5.4-centimeter, cylindrical, undisturbed soil cores using a pressure plate apparatus. Water retention at 0.5 and 15 bars was determined on disturbed soil samples by using a pressure membrane apparatus.

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Glossary

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base (chemistry). Any of the positive, generally metallic elements or combinations of elements that make up the nonacid plant nutrients. The most important of these in plant nutrition are calcium (Ca), potassium (K), magnesium (Mg), and ammonium (NH_4).

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bedding. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the lower horizons, as a result of waterlogging with poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The minerals horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching. The removal of soluble materials from soils or other material by percolating water.

Marl. An earthy, unconsolidated deposit formed in fresh-water lakes that consists chiefly of calcium carbonate mixed with various amounts of clay or other impurities.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* sizes—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimen-

sion and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability as are follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid*, and *very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Poorly graded. A soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Range condition. The state of health or productivity of both soil and forage in a given range, in terms of what productivity could or should be under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair*, and *poor.* The classification is based on the percentage of original, or climax, vegetation on the site, as compared to what ought to grow on it if management were good.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind of climax vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sandy soils. A broad term for soils of the sand and loamy sand classes; soil material with more than 70 percent sand and less than 15 percent clay.

Shrink-swell potential (engineering). Amount that a soil will expand when wet or contract when dry. Indicates kinds of clay in soil.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Site index. A numerical means of expressing the quality of a forest site that is based on the height of the dominant stand at an arbitrarily chosen age; for example, the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Soil variant. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes A horizon and part of B horizon; has no depth limit.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Well-graded soil. A soil or soil material consisting of particles that are well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

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For a full description of a mapping unit, read both the description of the mapping unit and that of

Acreage and extent, table 3, page 12.
Predicted yields, table 4, page 56.

Map symbol	Mapping unit	Described on page	Capability unit		Range site		Woodland group
			Symbol	Page	Name	Page	Number
An	Anclote sand	13	IIIw-2	51	Slough	59	14
As	Astatula fine sand, dark surface	13	IVs-1	53	Sandhill	58	2
At	Astatula-Urban land complex	14	-----	--	-------	--	--
Ba	Basinger sand	14	IVw-1	52	Slough	59	6
Br	Bradenton fine sand, shallow variant	15	IIIw-3	51	Hammock	58	13
Ca	Canaveral complex, gently undulating	16	VIs-4	54	Sand Scrub	59	4
Cc	Canaveral-Urban land complex	16	-----	--	-------	--	--
Cd	Canova peat	17	IIIw-4	51	Fresh Marsh (organic)	58	--
Ch	Chobee sandy loam	18	IIIw-2	51	Fresh Marsh (mineral)	57	14
Ck	Coastal beaches	18	VIIIw-1	55	-------	--	--
Co	Cocoa sand	19	IVs-3	53	Sandhill	58	9
Cp	Copeland complex	19	IVw-3	53	Hammock	58	12
Eg	EauGallie sand	20	IVw-2	52	Acid Flatwoods	57	10
Eu	EauGallie sand, bedded	21	IVw-2	52	-------	--	--
Ew	EauGallie, Winder, and Felda soils, ponded	21	VIw-1	54	Sand Pond	59	7
Fa	Felda sand	22	IIIw-1	51	Fresh Marsh (mineral)	57	11
Fd	Felda sand, bedded	22	IIIw-1	51	-------	--	--
Fe	Felda and Winder soils	23	IIIw-1	51	Slough	59	11
Fg	Felda and Winder soils, ponded	23	VIw-1	54	Salt Marsh (mineral)	58	7
Fn	Floridana sand	24	IIIw-2	51	Fresh Marsh (mineral)	57	14
Fo	Floridana, Chobee, and Felda soils, flooded	24	VIIw-1	54	Fresh Marsh (mineral)	57	--
Ga	Galveston-Urban land complex	24	-----	--	-------	--	--
Ho	Holopaw sand	25	IVw-1	52	Fresh Marsh (mineral)	57	11
Im	Immokalee sand	26	IVw-2	52	Acid Flatwoods	57	5
Ma	Malabar sand	27	IVw-1	52	Sweet Flatwoods	60	11
Mb	Malabar, Holopaw, and Pineda soils	27	IVw-1	52	Sweet Flatwoods	60	11
Mc	Micco peat	28	IIIw-4	51	Fresh Marsh (organic)	58	--
Me	Montverde peat	29	IIIw-4	51	Fresh Marsh (organic)	58	--
Mk	Myakka sand	30	IVw-2	52	Acid Flatwoods	57	5

the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Soil limitations for nonfarm uses, table 7, page 74.
Engineering uses of the soils, tables 8, 9, and 10, pages 84 to 105.

Map symbol	Mapping unit	Described on page	Capability unit		Range site		Woodland group
			Symbol	Page	Name	Page	Number
Mp	Myakka sand, ponded	30	VIIw-2	54	Sand Pond	59	7
Mu	Myakka-Urban land complex	31	-----	--	-------	--	--
Od	Oldsmar sand	31	IVw-2	52	Acid Flatwoods	57	10
Or	Orsino fine sand	32	IVs-2	53	Sand Scrub	59	4
Pb	Palm Beach sand	33	VIIs-2	55	Sand Scrub	59	1
PfB	Paola fine sand, 0 to 5 percent slopes	34	VIs-1	54	Sand Scrub	59	1
PfD	Paola fine sand, 5 to 12 percent slopes	34	VIIs-1	55	Sand Scrub	59	1
Ph	Paola-Urban land complex	34	-----	-	-------	--	--
Pk	Parkwood fine sand, moderately fine subsoil variant	35	IIIw-1	51	Hammock	58	12
Pn	Pineda sand	36	IIIw-1	51	Sweet Flatwoods	60	11
Po	Pineda sand, bedded	36	IIIw-1	51	-------	--	--
Pp	Pineda sand, dark surface variant	37	IIIw-1	51	Hammock	58	11
Ps	Pomello sand	38	VIs-3	54	Sand Scrub	59	3
Pu	Pomello-Urban land complex	38	-----	--	-------	--	--
Pw	Pompano sand	38	IVw-1	52	Slough	59	6
Qr	Quartzipsamments, smoothed	39	-----	--	-------	--	--
Sa	Satellite sand	39	VIs-3	54	Acid Flatwoods	57	3
Sb	St. Johns sand	40	IIIw-1	51	Acid Flatwoods	57	10
Sc	St. Johns soils, ponded	40	Vw-1	54	Slough	59	7
SfB	St. Lucie fine sand, 0 to 5 percent slopes	41	VIIs-1	55	Sand Scrub	59	1
SfD	St. Lucie fine sand, 5 to 12 percent slopes	41	VIIs-1	55	Sand Scrub	59	1
Sp	Spoil banks	41	-----	--	-------	--	--
Sw	Swamp	41	VIIw-1	54	Swamp	60	--
Ta	Tavares fine sand	42	IIIs-1	52	Sandhill	58	8
Tc	Terra Ceia muck	43	IIIw-4	51	Fresh Marsh (organic)	58	--
Tm	Tidal marsh	43	VIIIw-2	55	Salt Marsh (mineral)	58	--
Ts	Tidal swamp	43	VIIIw-2	55	-------	--	--
Tw	Tomoka muck	44	IIIw-4	51	Fresh Marsh (organic)	58	--
Ur	Urban land	45	-----	--	-------	--	--
Va	Valkaria sand	45	IVw-1	52	Slough	59	6
Wa	Wabasso sand	46	IIIw-1	51	Acid Flatwoods	57	10
We	Welaka sand	47	VIs-2	54	Sand Scrub	59	4
Wn	Winder loamy sand	48	IIIw-1	51	Fresh Marsh (mineral)	57	13

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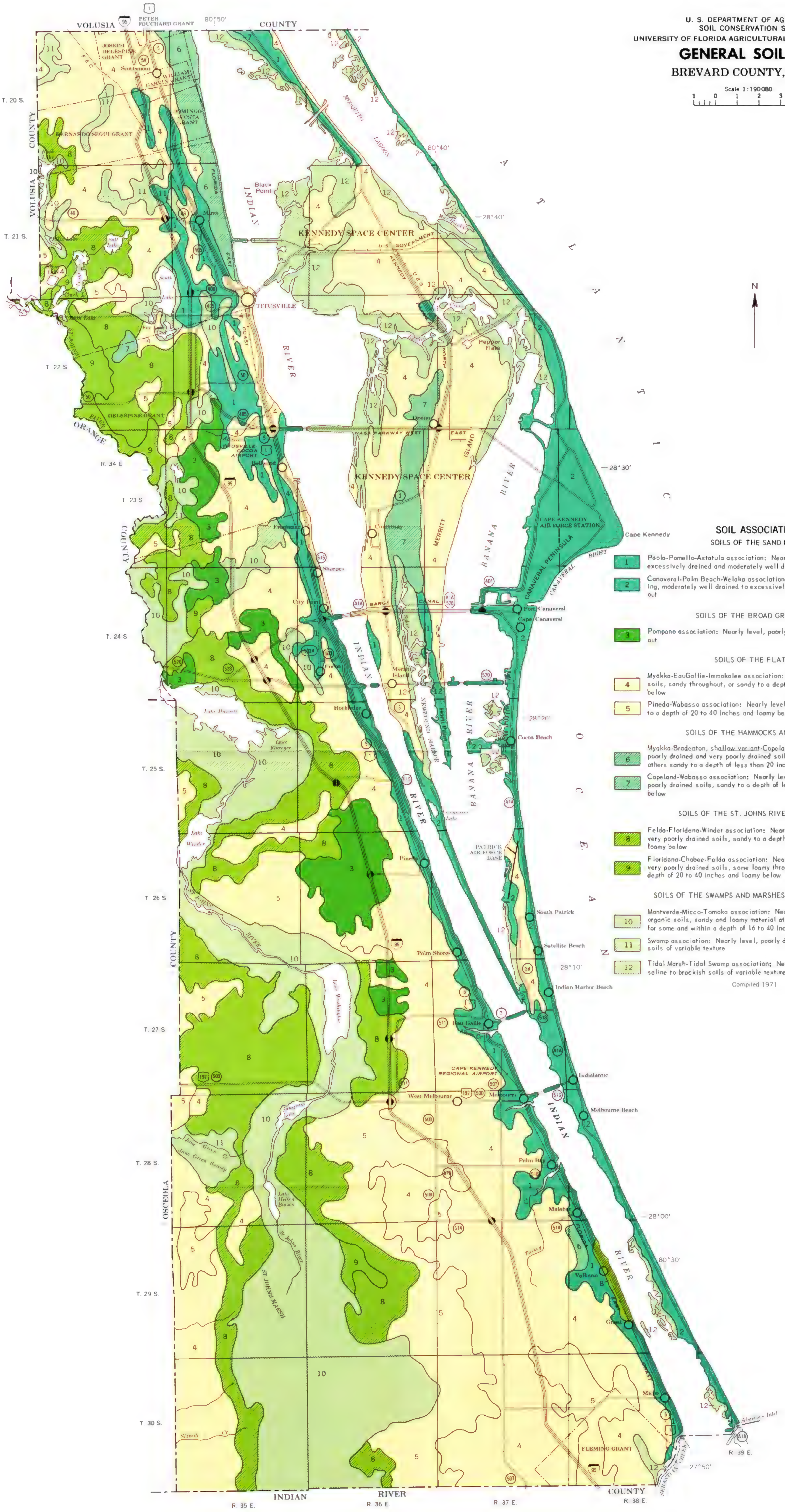
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF FLORIDA AGRICULTURAL EXPERIMENT STATIONS

GENERAL SOIL MAP

BREVARD COUNTY, FLORIDA

Scale 1:190080



SOIL ASSOCIATIONS

SOILS OF THE SAND RIDGES

1 Paola-Pomello-Astatula association: Nearly level to strongly sloping, excessively drained and moderately well drained soils, sandy throughout

2 Canaveral-Palm Beach-Welaka association: Nearly level to gently sloping, moderately well drained to excessively drained soils, sandy throughout

SOILS OF THE BROAD GRASSY FLATS

3 Pompano association: Nearly level, poorly drained soils, sandy throughout

SOILS OF THE FLATWOODS

4 Myakka-EauGallie-Immokalee association: Nearly level, poorly drained soils, sandy throughout, or sandy to a depth of 40 inches and loamy below

5 Pineda-Wabasso association: Nearly level, poorly drained soils, sandy to a depth of 20 to 40 inches and loamy below

SOILS OF THE HAMMOCKS AND LOW RIDGES

6 Myakka-Bradenton, shallow variant-Copeland association: Nearly level, poorly drained and very poorly drained soils, some sandy throughout and others sandy to a depth of less than 20 inches and loamy below

7 Copeland-Wabasso association: Nearly level, very poorly drained and poorly drained soils, sandy to a depth of less than 40 inches and loamy below

SOILS OF THE ST. JOHNS RIVER FLOOD PLAINS

8 Felda-Floridana-Winder association: Nearly level, poorly drained and very poorly drained soils, sandy to a depth of less than 40 inches and loamy below

9 Floridana-Chobee-Felda association: Nearly level, poorly drained and very poorly drained soils, some loamy throughout and others sandy to a depth of 20 to 40 inches and loamy below

SOILS OF THE SWAMPS AND MARSHES AND VERY WET AREAS

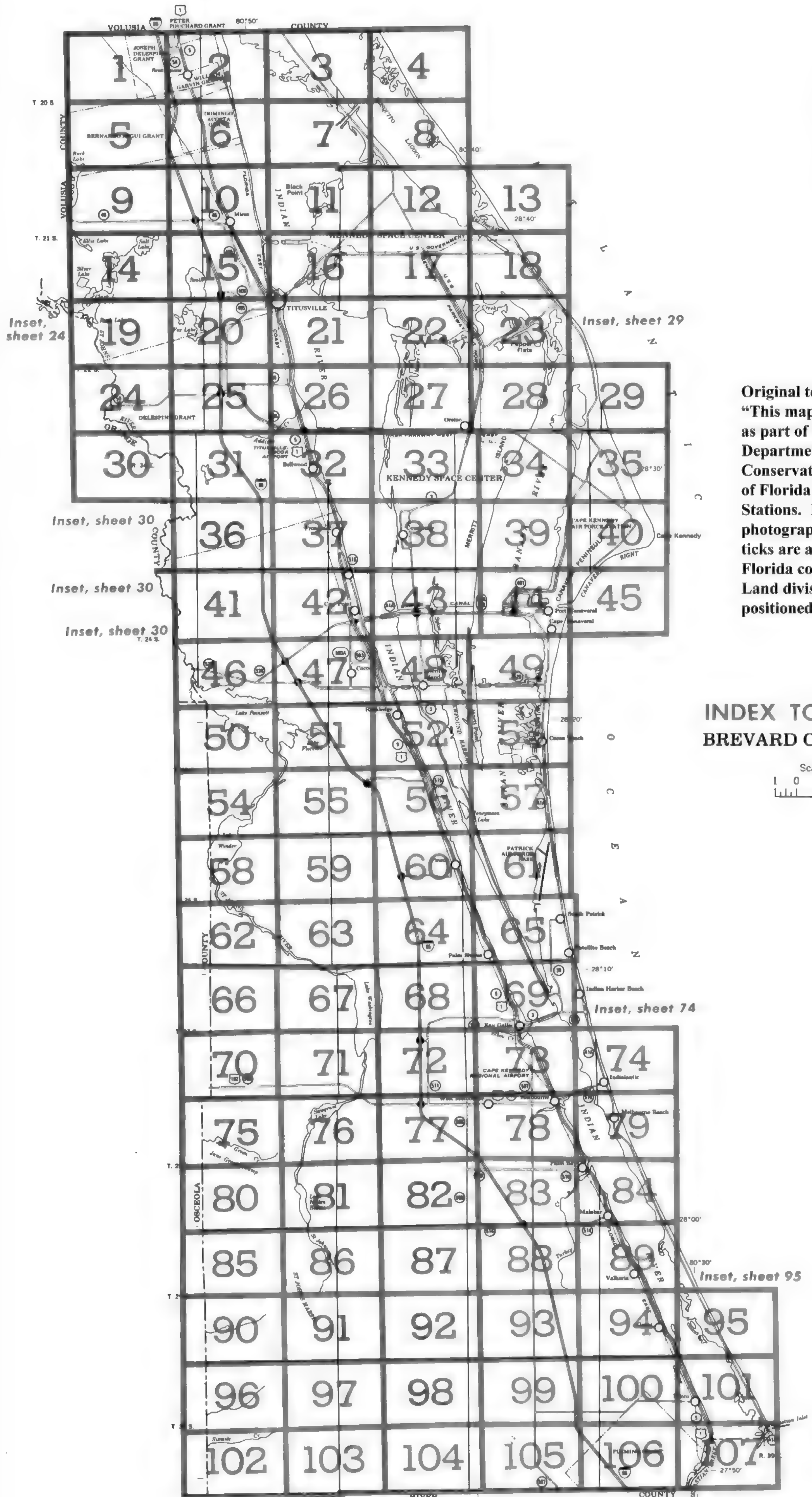
10 Montverde-Micco-Tomoka association: Nearly level, very poorly drained, organic soils, sandy and loamy material at a depth of more than 52 inches for some and within a depth of 16 to 40 inches for others

11 Swamp association: Nearly level, poorly drained and very poorly drained soils of variable texture

12 Tidal Marsh-Tidal Swamp association: Nearly level, very poorly drained, saline to brackish soils of variable texture

Compiled 1971

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



Original text from each map sheet:
"This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the University of Florida Agricultural Experiment Stations. Photobase from 1965 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Florida coordinate system, east zone. Land division corners are approximately positioned on this map."

INDEX TO MAP SHEETS
BREVARD COUNTY, FLORIDA

Scale 1:316,800

1 0 1 2 3 4 5 Miles

SOIL LEGEND

The first capital letter is the initial one of the mapping unit name. The second capital letter, B or D, shows the class of slope. Symbols without a slope letter are those of nearly level soils.

SYMBOL	NAME
An	Anclote sand
As	Astatula fine sand, dark surface
At	Astatula-Urban land complex
Ba	Basinger sand
Br	Bradenton fine sand, shallow variant
Ca	Canaveral complex, gently undulating
Cc	Canaveral-Urban land complex
Cd	Canova peat
Ch	Chobee sandy loam
Ck	Coastal beaches
Co	Cocoa sand
Cp	Copeland complex
Eg	EauGallie sand
Eu	EauGallie sand, bedded
Ew	EauGallie, Winder, and Felda soils, ponded
Fa	Felda sand
Fd	Felda sand, bedded
Fe	Felda and Winder soils
Fg	Felda and Winder soils, ponded
Fn	Floridana sand
Fo	Floridana, Chobee, and Felda soils, flooded
Ga	Galveston-Urban land complex
Ho	Holopaw sand
Im	Immokalee sand
Ma	Malabar sand
[illegible]	Malabar, Holopaw, and Pineda soils
Mc	Micco peat
[illegible]	Montverde peat
Mk	Myakka sand
Mp	Myakka sand, ponded
Mu	Myakka-Urban land complex
Od	Oldsmar sand
Or	Orsino fine sand
Pb	Palm Beach sand
PfB	Paola fine sand, 0 to 5 percent slopes
PfD	Paola fine sand, 5 to 12 percent slopes
Ph	Paola-Urban land complex
Pk	Parkwood fine sand, moderately fine subsoil variant
Pn	Pineda sand
Po	Pineda sand, bedded
Pp	Pineda sand, dark surface variant
Ps	Pomello sand
Pu	Pomello-Urban land complex
Pw	Pompano sand
Qr	Quartzipamments, smoothed
Sa	Satellite sand
Sb	St. Johns sand
Sc	St. Johns soils, ponded
SfB	St. Lucie fine sand, 0 to 5 percent slopes
SfD	St. Lucie fine sand, 5 to 12 percent slopes
Sp	Spoil banks
Sw	Swamp
Ta	Tavares fine sand
Tc	Terra Ceia muck
Tm	Tidal marsh
Ts	Tidal swamp
Tw	Tomoka muck
Ur	Urban land
Va	Valkaria sand
Wa	Wabasso sand
We	Welaka sand
Wn	Winder loamy sand

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Lighthouse

Breakwater, wharf, dock, jetty

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Submerged Marsh (S.M.)

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

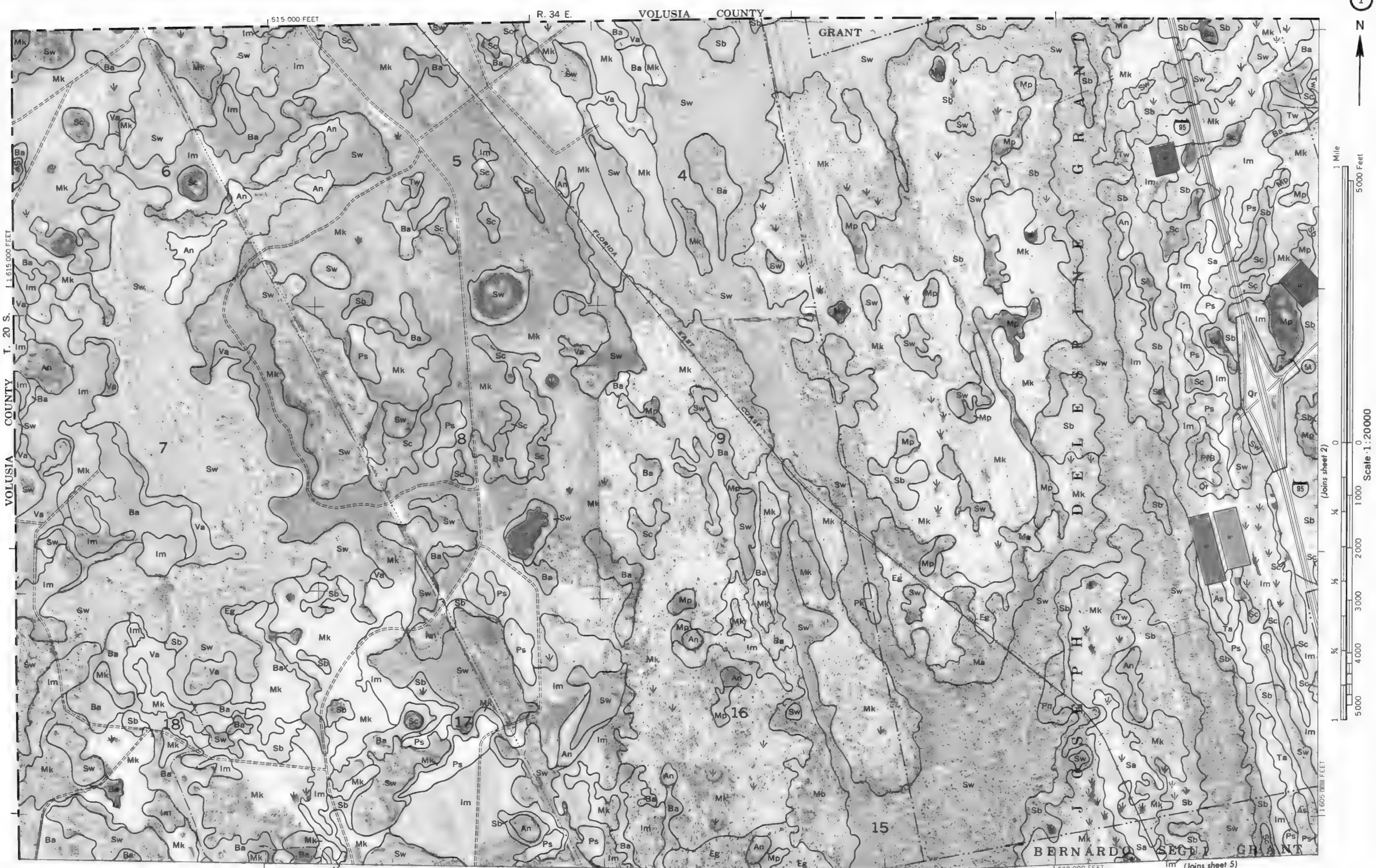
Short steep slope

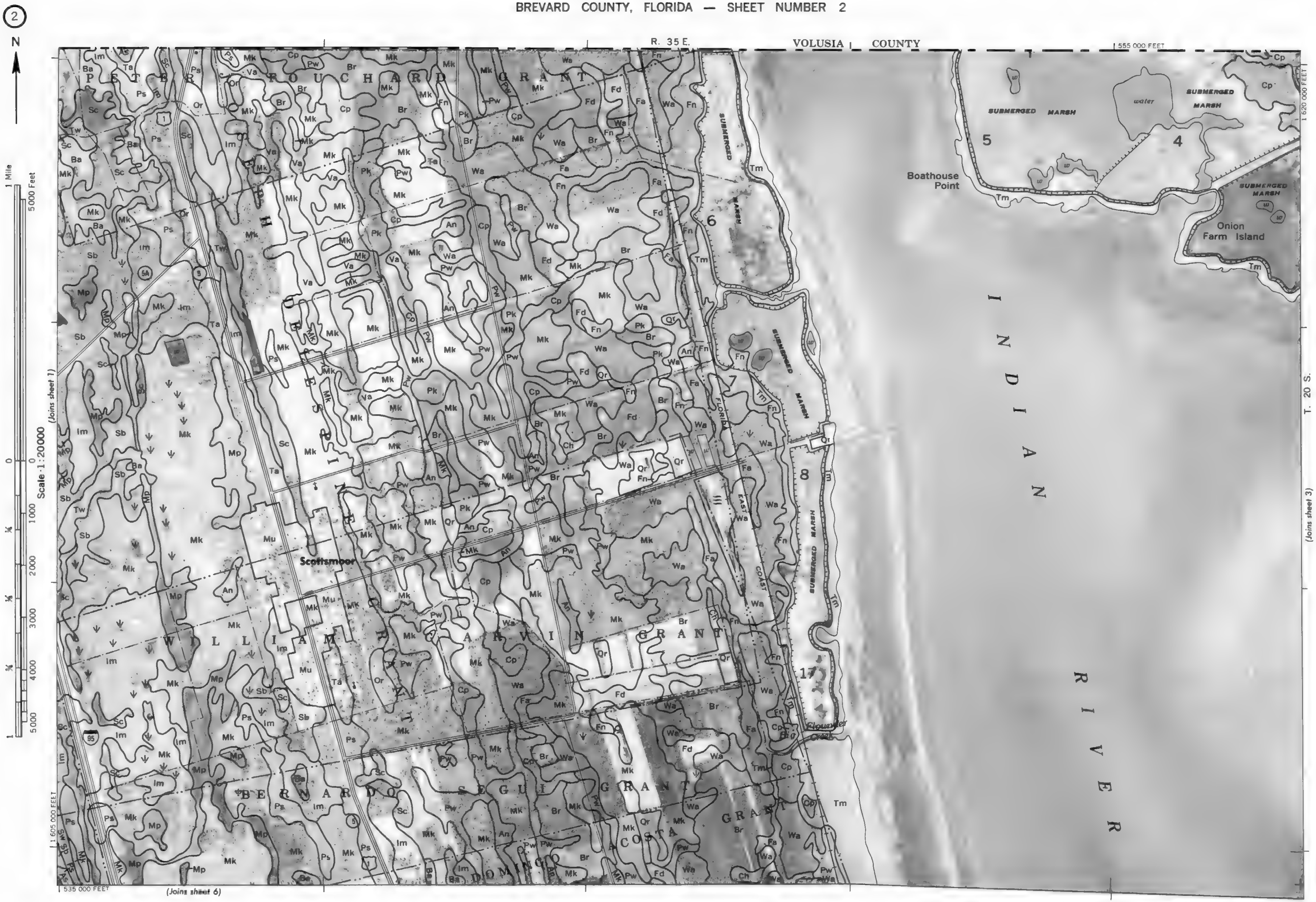
Prominent peak

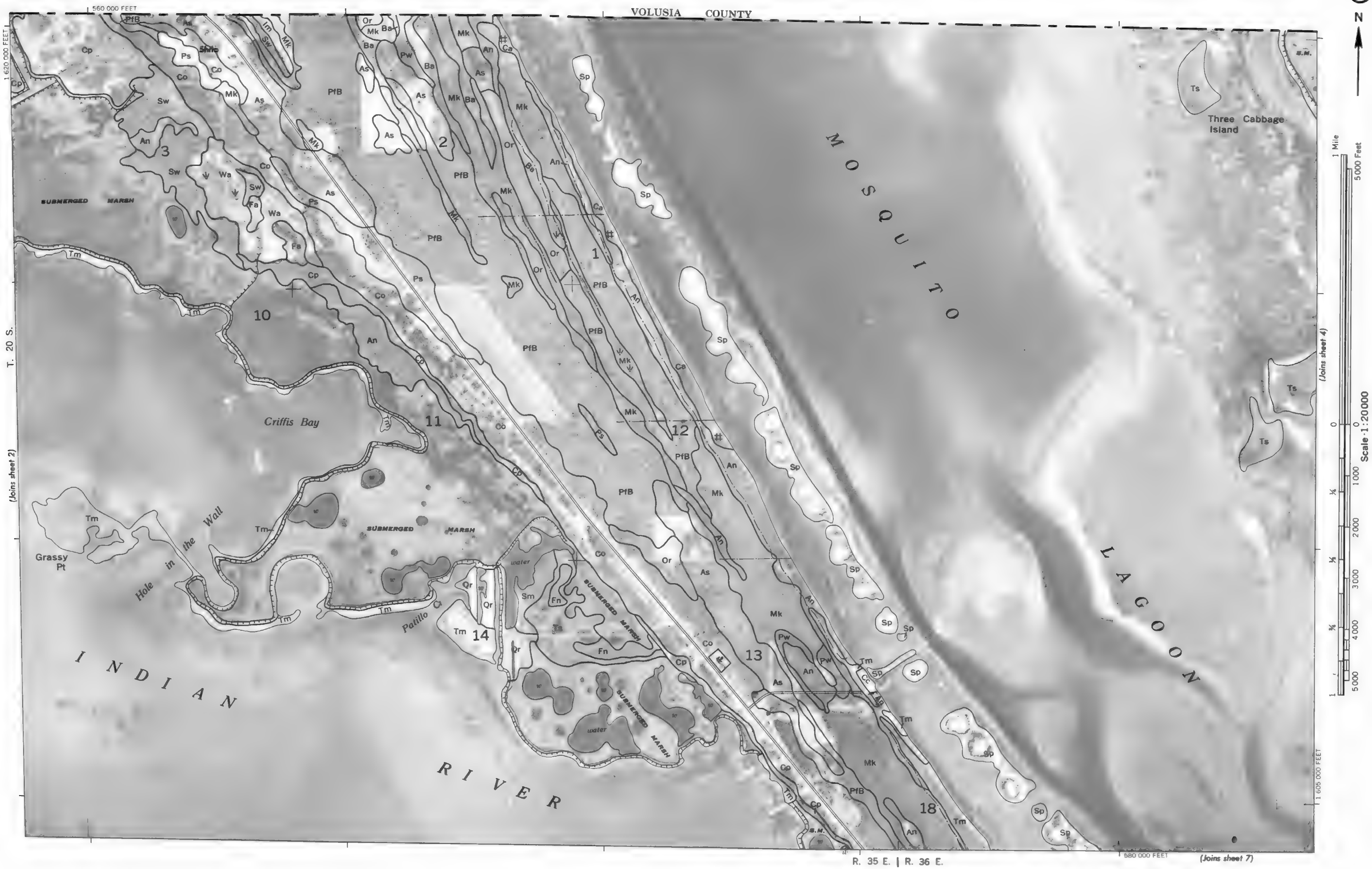
Depressions (Large / Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

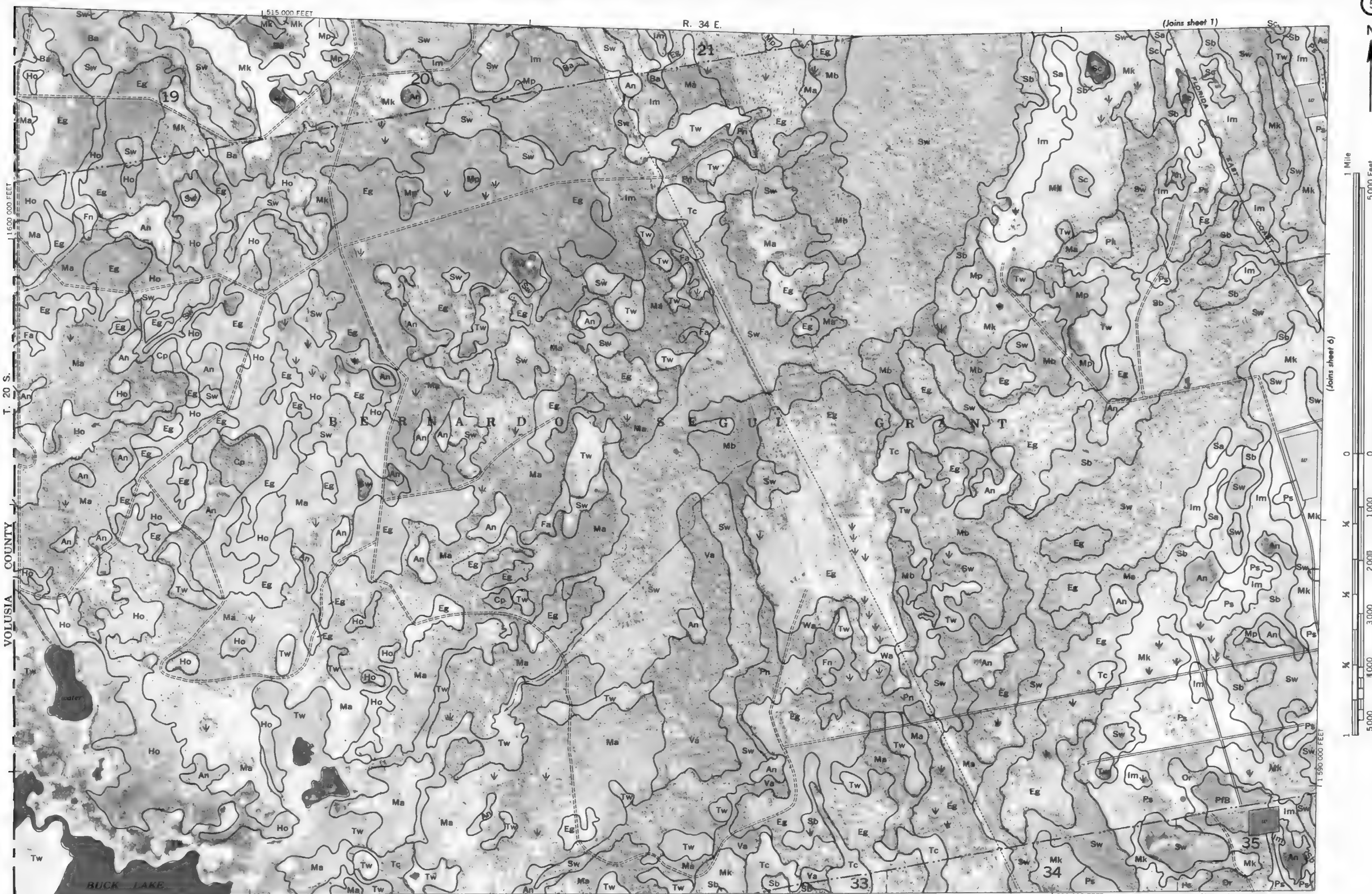
- Soil boundary and symbol (Dx)
- Gravel
- Stoniness: Stony; Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Kitchen midden

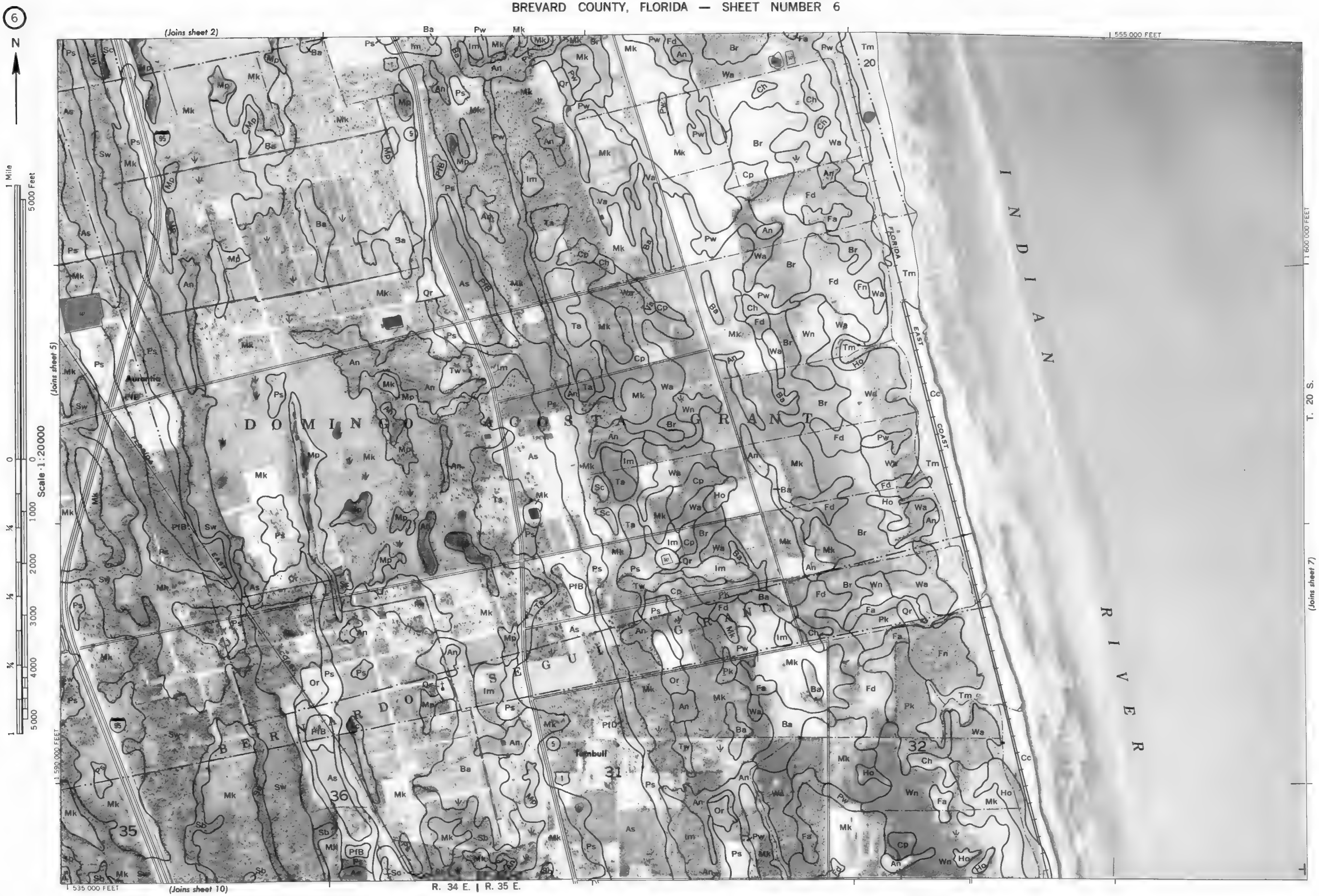

VOLUSIA COUNTY
GRANT
R. 34 E.
515 000 FEET
VOLUSIA COUNTY
T. 20 S.
1 615 000 FEET
FLORIDA EAST COAST
JOSEPH DELESPINE GRANT
BERNARDO SEGUI GRANT
530 000 FEET
1 605 000 FEET
(Joins sheet 2)
(Joins sheet 5)
Scale 1:20000
1 Mile
5000 Feet
N
1


2
N
VOLUSIA COUNTY
R. 35 E.
555 000 FEET
1 620 000 FEET
T. 20 S.
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 6)
535 000 FEET
1 605 000 FEET
1 Mile
5000 Feet
Scale 1:20000
PETER BOUCHARD GRANT
EPHRIAM HARRIS GRANT
WILLIAM CARVIN GRANT
BERNARDO SEGUI GRANT
DOMINGO ACOSTA GRANT
Scottsmoor
Boathouse Point
Onion Farm Island
INDIAN RIVER
SUBMERGED MARSH
FLORIDA EAST COAST
Clouder Creek
Big Flounder Creek


3
N
VOLUSIA COUNTY
560 000 FEET
1 620 000 FEET
MOSQUITO
LAGOON
Three Cabbage Island
SUBMERGED MARSH
Criffis Bay
Grassy Pt
Hole in the Wall
Patillo Cr
INDIAN
RIVER
T. 20 S.
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 7)
R. 35 E. | R. 36 E.
580 000 FEET
1 605 000 FEET
1 Mile
5000 Feet
Scale 1:20000
1
2
3
10
11
12
13
14
18


4
N
VOLUSIA CO
ATLANTIC OCEAN
MOSQUITO LAGOON
Pardon Island
Pardon Slough
Widgeon Bay
SUBMERGED MARSH
water
Pb
Ck
Tm
Ts
w
5
4
9
10
15
16
22
(Joins sheet 3)
(Joins sheet 8)
R. 36 E.
T. 20 S.
585 000 FEET
605 000 FEET
1 605 000 FEET
1 620 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1

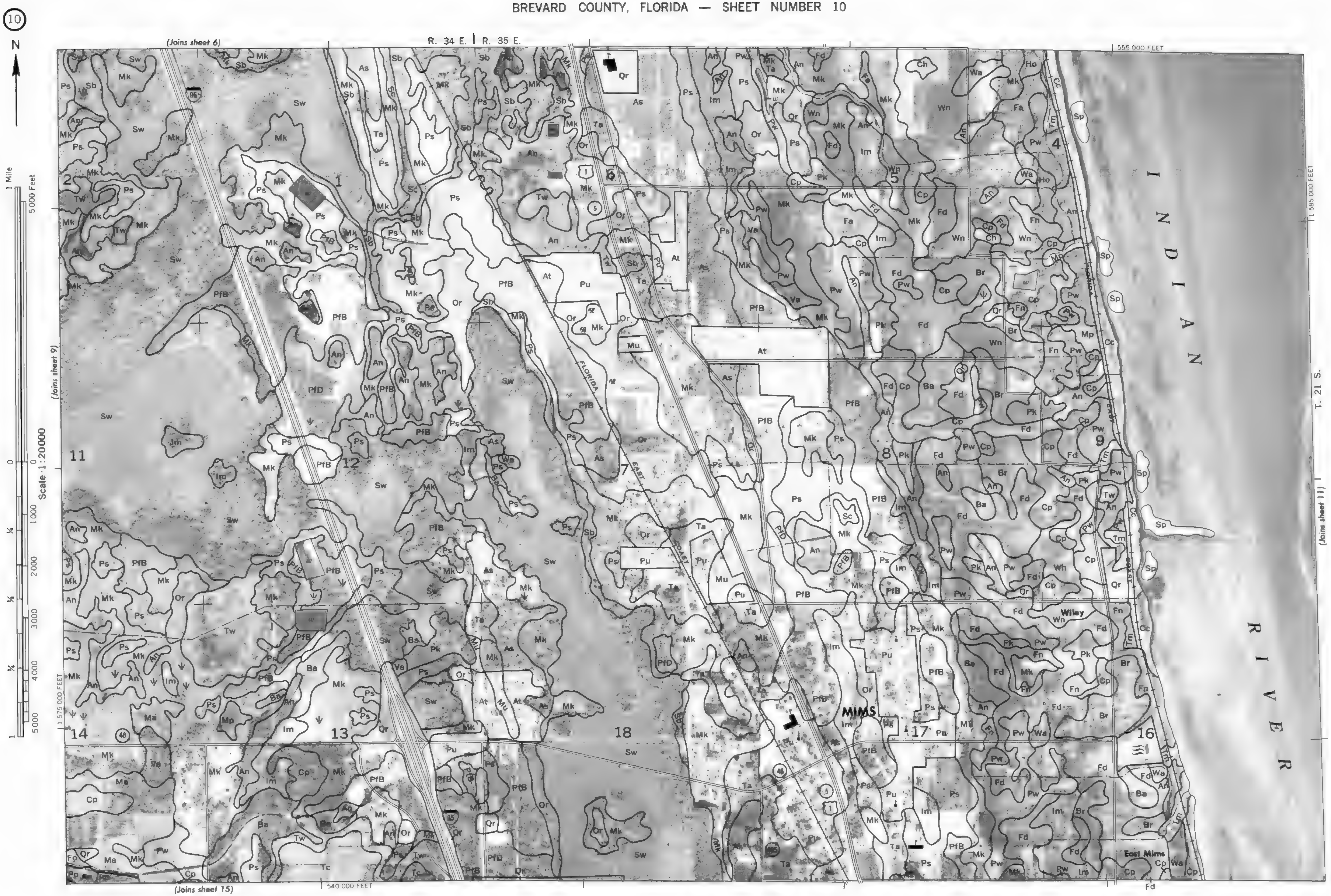

N
515 000 FEET
R. 34 E.
(Joins sheet 1)
1 600 000 FEET
T. 20 S.
VOLUSIA COUNTY
BERNARDO SEGUI GRANT
FLORIDA EAST COAST
(Joins sheet 6)
1 590 000 FEET
530 000 FEET
(Joins sheet 9)
BUCK LAKE
water
19
20
21
33
34
35
1 Mile
5000 Feet
Scale 1:20000

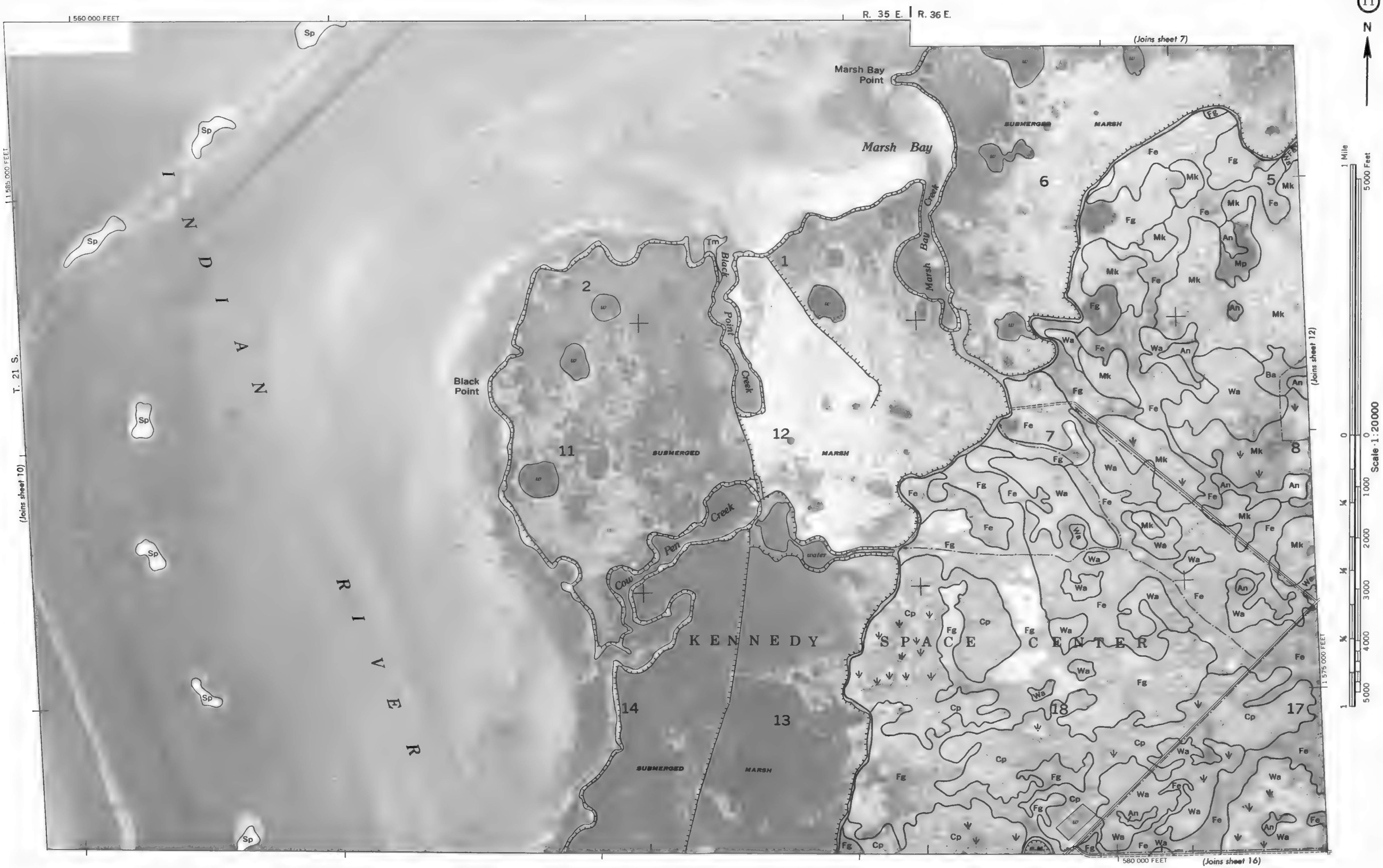

6
N
(Joins sheet 2)
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 10)
555 000 FEET
535 000 FEET
1 600 000 FEET
1 590 000 FEET
1 Mile
5000 Feet
Scale 1:20000
R. 34 E. | R. 35 E.
T. 20 S.
INDIAN RIVER
DOMINGO ACOSTA GRANT
BERNARDO SEGUI GRANT
Aurantia
Turnbull
FLORIDA EAST COAST
31
32
35
36
20

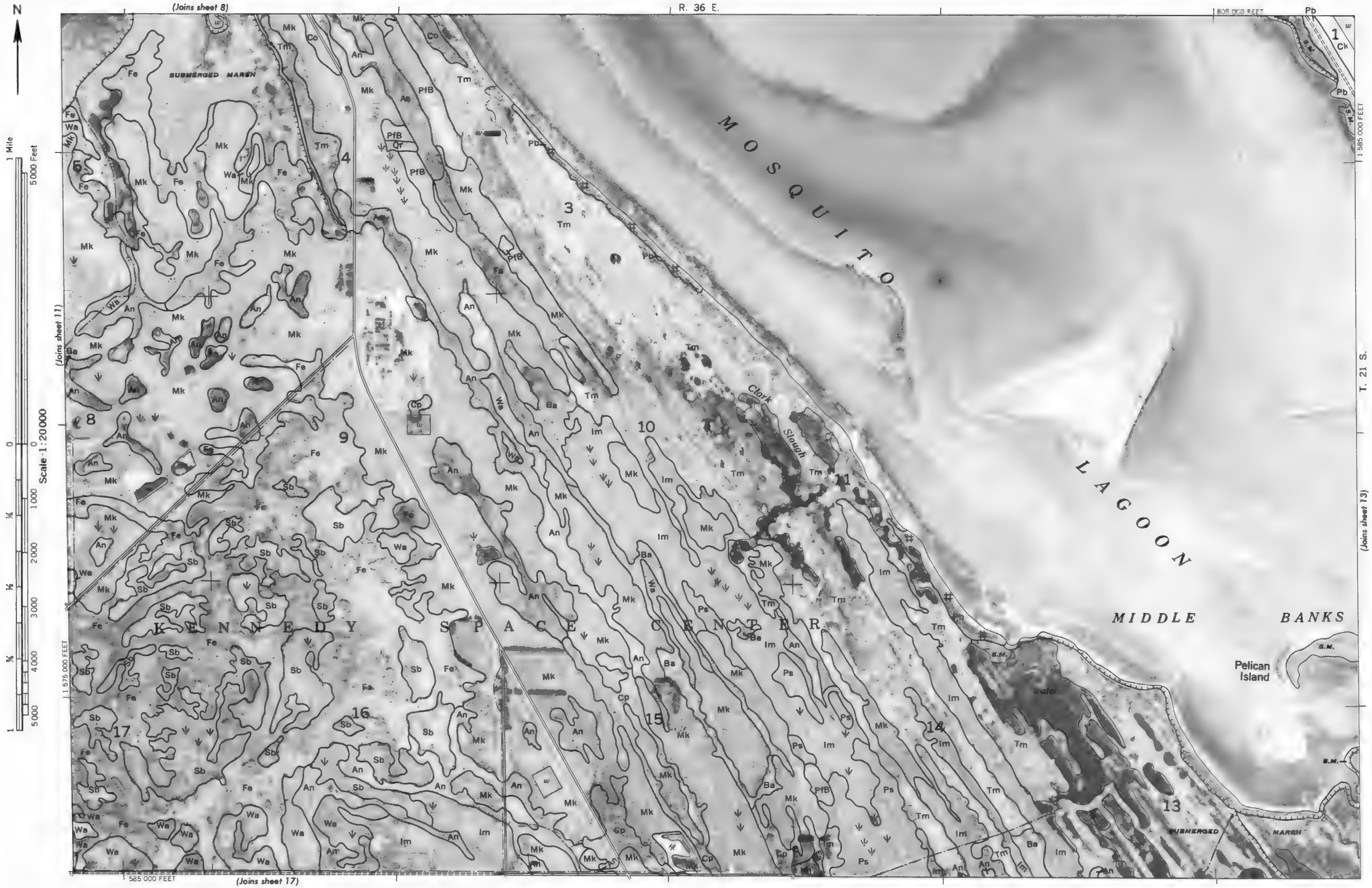

7
N
R. 35 E. R. 36 E.
560 000 FEET
(Joins sheet 3)
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)
1 600 000 FEET
1 590 000 FEET
580 000 FEET
T. 20 S.
INDIAN RIVER
MOSQUITO LAGOON
Duckroost Point
Duckroost Cove
Allenhurst
HAULOVER CANAL
Granny Cove
Dummit Cove
Dummit Creek
SUBMERGED MARSH
13
18
19
20
29
30
31
32
Sp
Co
Cc
Cp
Mk
An
Tm
Ta
Pk
PfB
Ck
water
S.M.
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

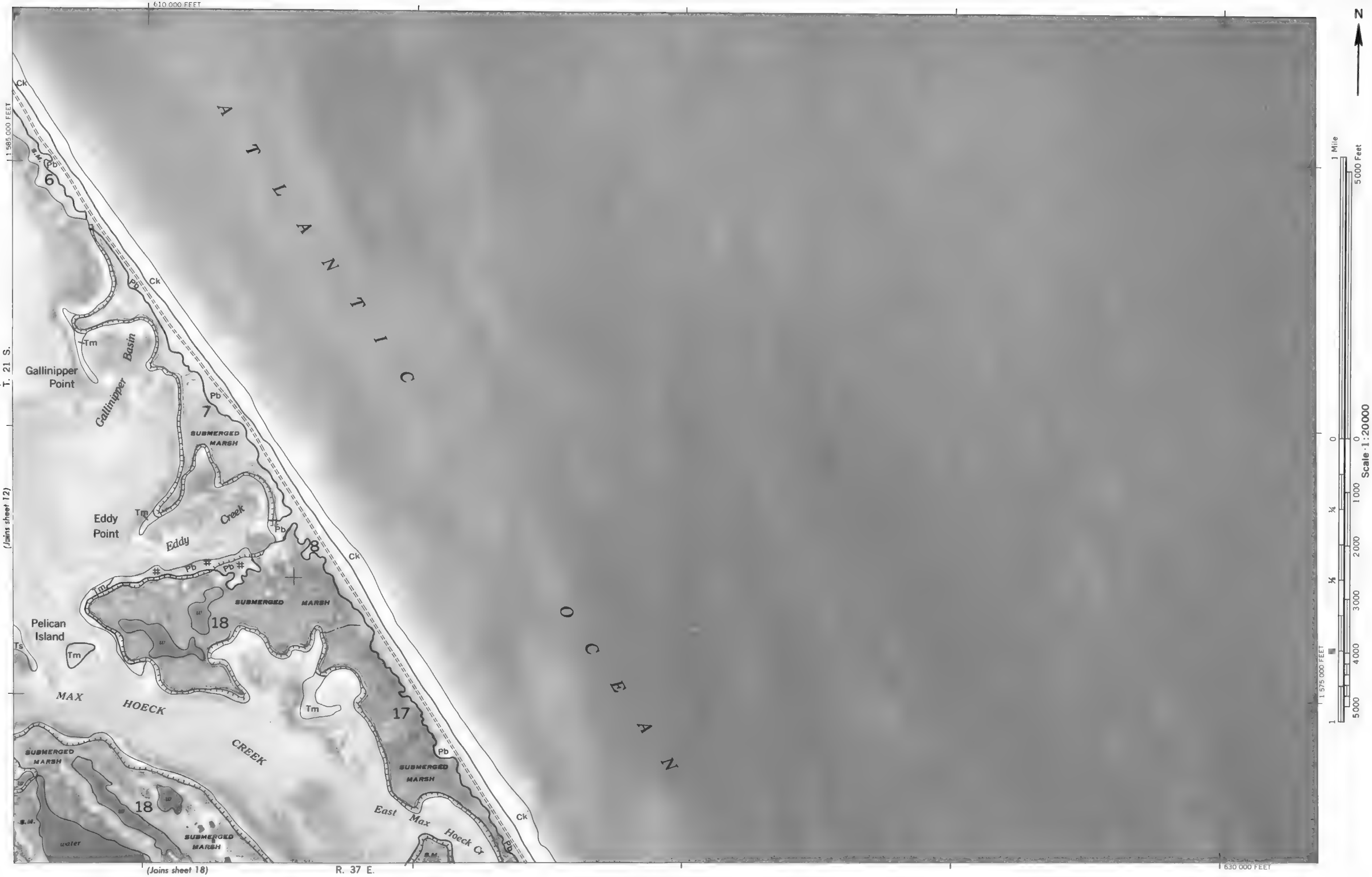
BREVARD COUNTY, FLORIDA — SHEET NUMBER 8

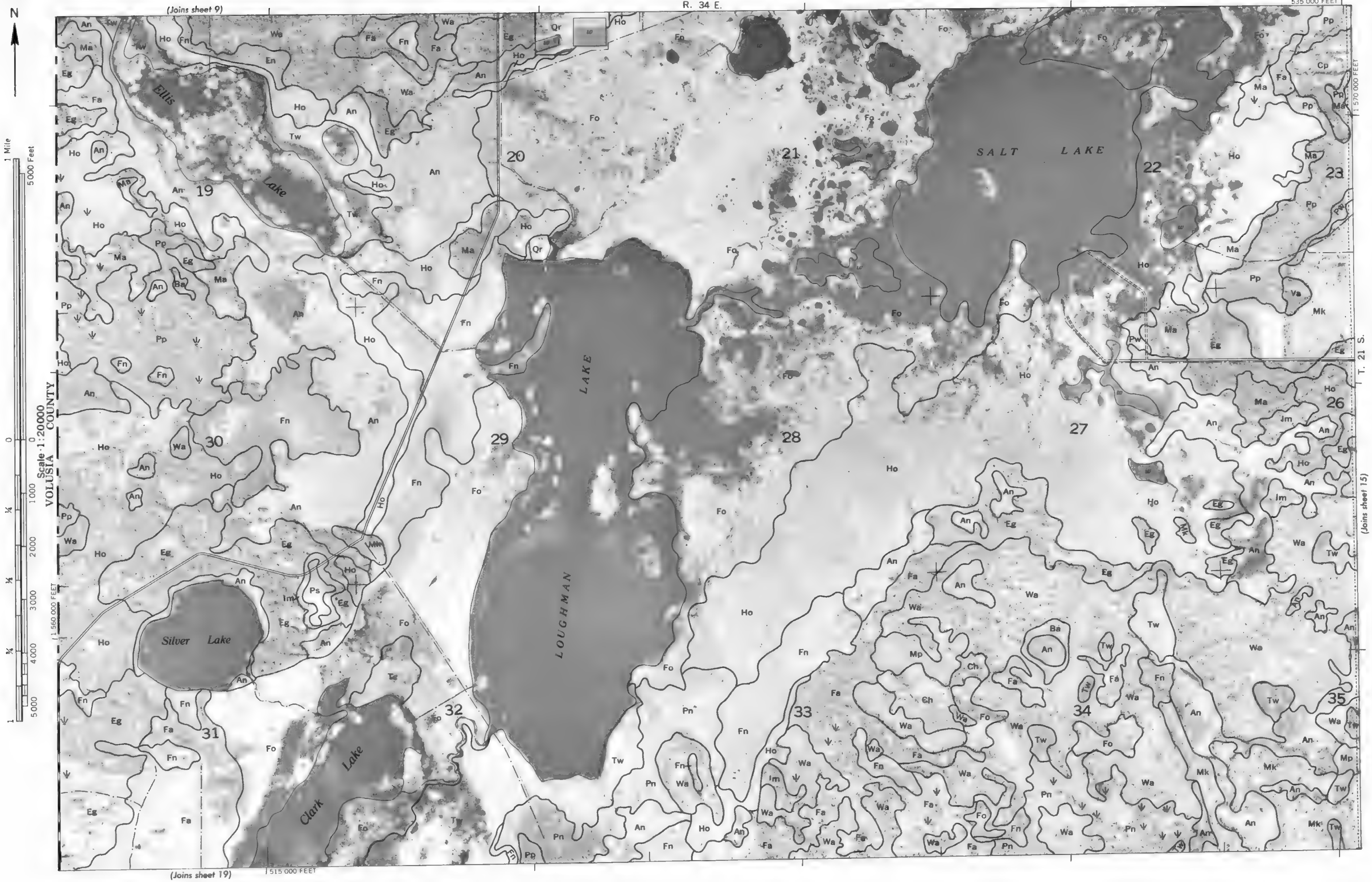

9
N
515 000 FEET
R. 34 E.
(Joins sheet 5)
BUCK LAKE
BERNARDO SEGUI GRANT
1 585 000 FEET
T. 21 S.
VOLUSIA COUNTY
Freshwater Lake
(Joins sheet 10)
Sixmile Creek
Southmere
water
(Joins sheet 14)
535 000 FEET
1 575 000 FEET
1 Mile
5000 Feet
Scale 1:20000
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

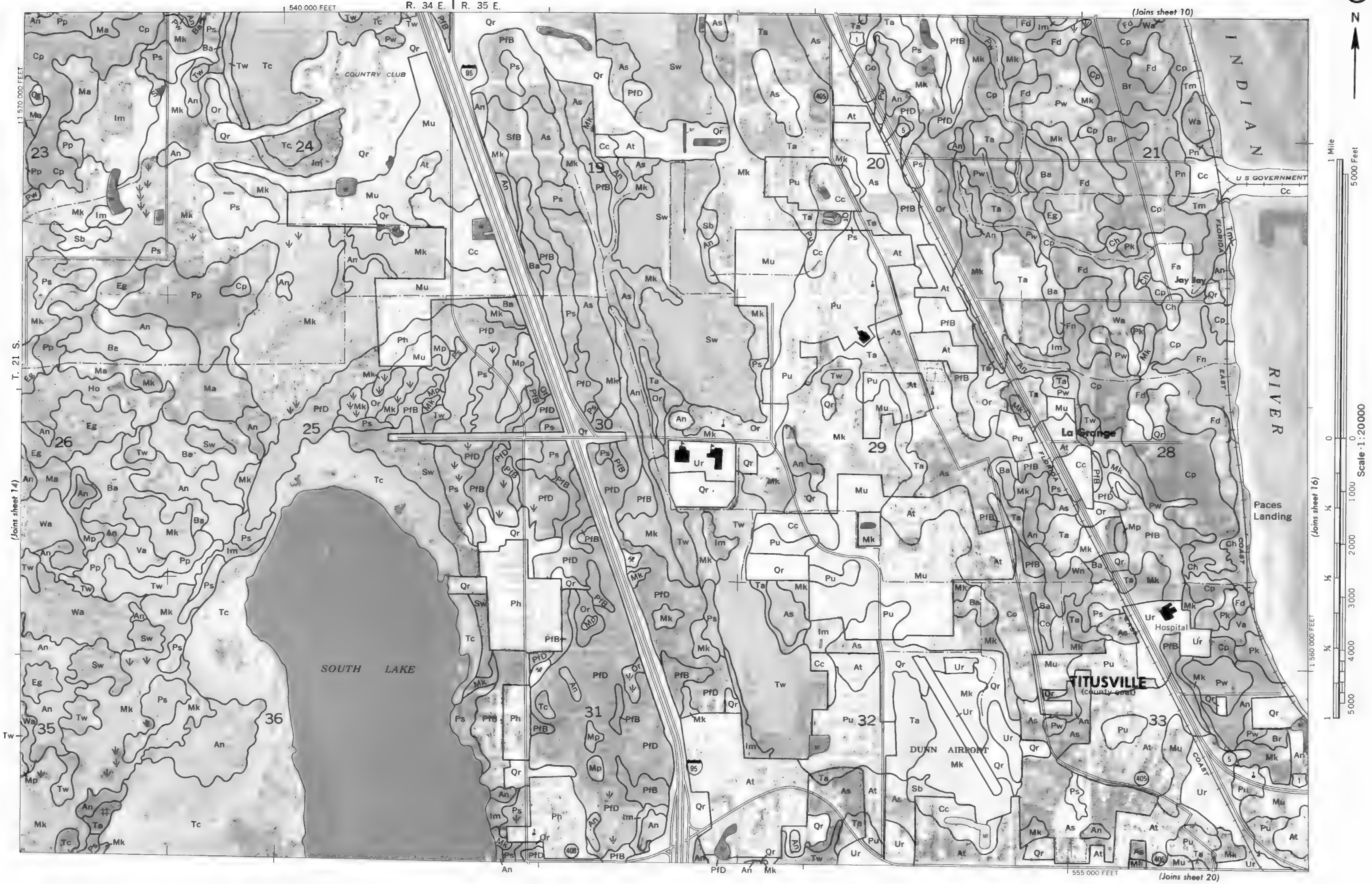

10
N
(Joins sheet 6)
R. 34 E. | R. 35 E.
555 000 FEET
1 585 000 FEET
T. 21 S.
(Joins sheet 11)
(Joins sheet 9)
(Joins sheet 15)
540 000 FEET
1 575 000 FEET
Scale 1:20000
1 Mile
5000 Feet
INDIAN RIVER
MIMS
Wiley
East Mims


11
N
560 000 FEET
R. 35 E.
R. 36 E.
(Joins sheet 7)
1 585 000 FEET
T. 21 S.
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 16)
580 000 FEET
1 575 000 FEET
Marsh Bay Point
Marsh Bay
Black Point
Black Point Creek
Marsh Bay Creek
Cow Pen Creek
INDIAN RIVER
KENNEDY SPACE CENTER
SUBMERGED MARSH
water
Scale 1:20000
1 Mile
5000 Feet
Sp
Tm
Fe
Fg
Mk
An
Mp
Wa
Ba
Cp
1
2
5
6
7
8
11
12
13
14
17
18

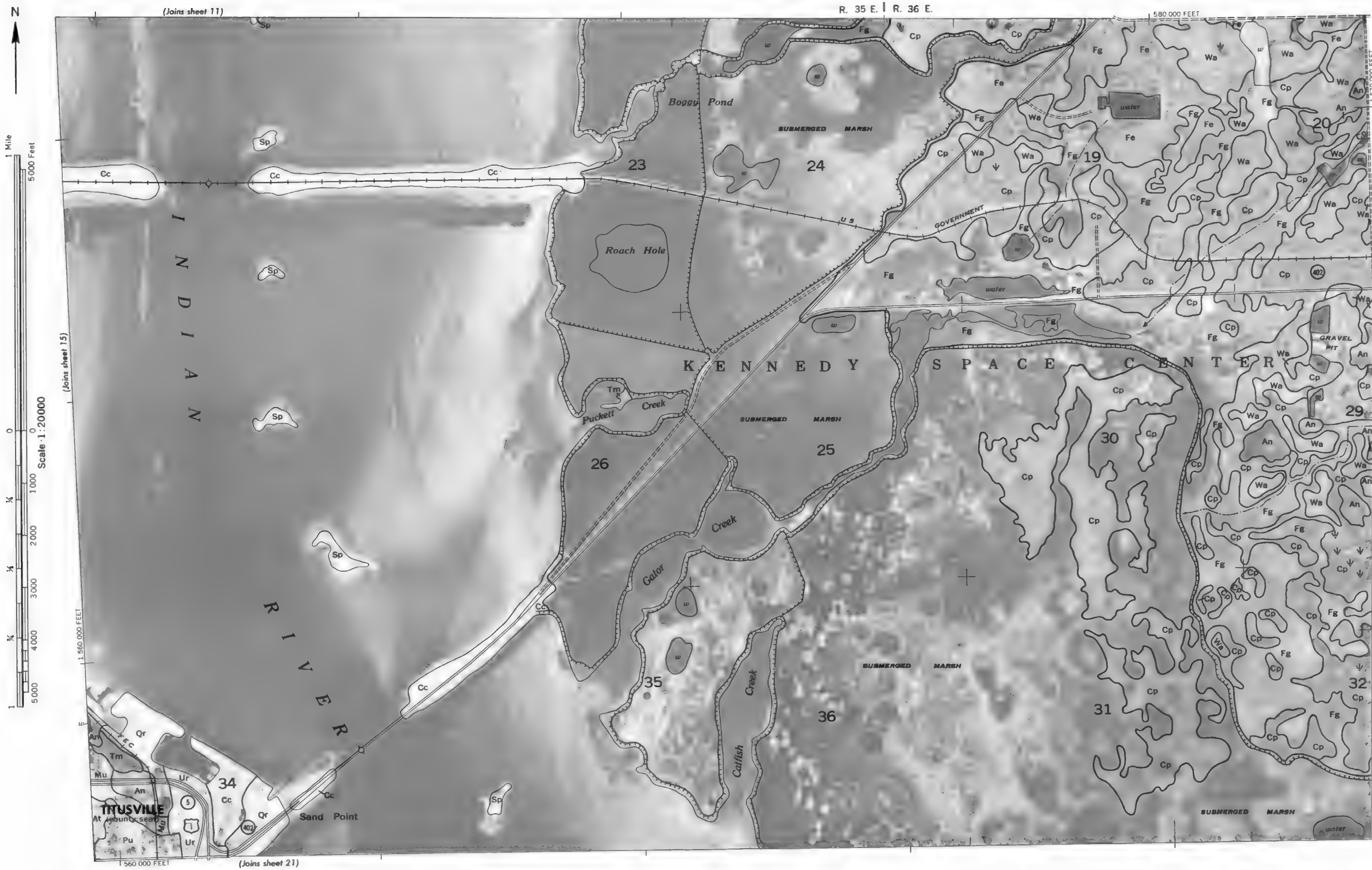

12
N
(Joins sheet 8)
R. 36 E.
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 17)
T. 21 S.
585 000 FEET
1 575 000 FEET
1 585 000 FEET
1 Mile
5000 Feet
Scale 1:20000
SUBMERGED MARSH
MOSQUITO LAGOON
Clark Slough
KENNEDY SPACE CENTER
MIDDLE BANKS
Pelican Island
SUBMERGED MARSH


13
N
610 000 FEET
1 585 000 FEET
1 575 000 FEET
630 000 FEET
ATLANTIC OCEAN
T. 21 S.
(Joins sheet 12)
(Joins sheet 18)
R. 37 E.
Gallinipper Point
Gallinipper Basin
Eddy Point
Eddy Creek
Pelican Island
MAX HOECK CREEK
East Max Hoeck Cr
SUBMERGED MARSH
water
Ck
Pb
Tm
Ts
6
7
8
17
18
1 Mile
5000 Feet
Scale 1:20000

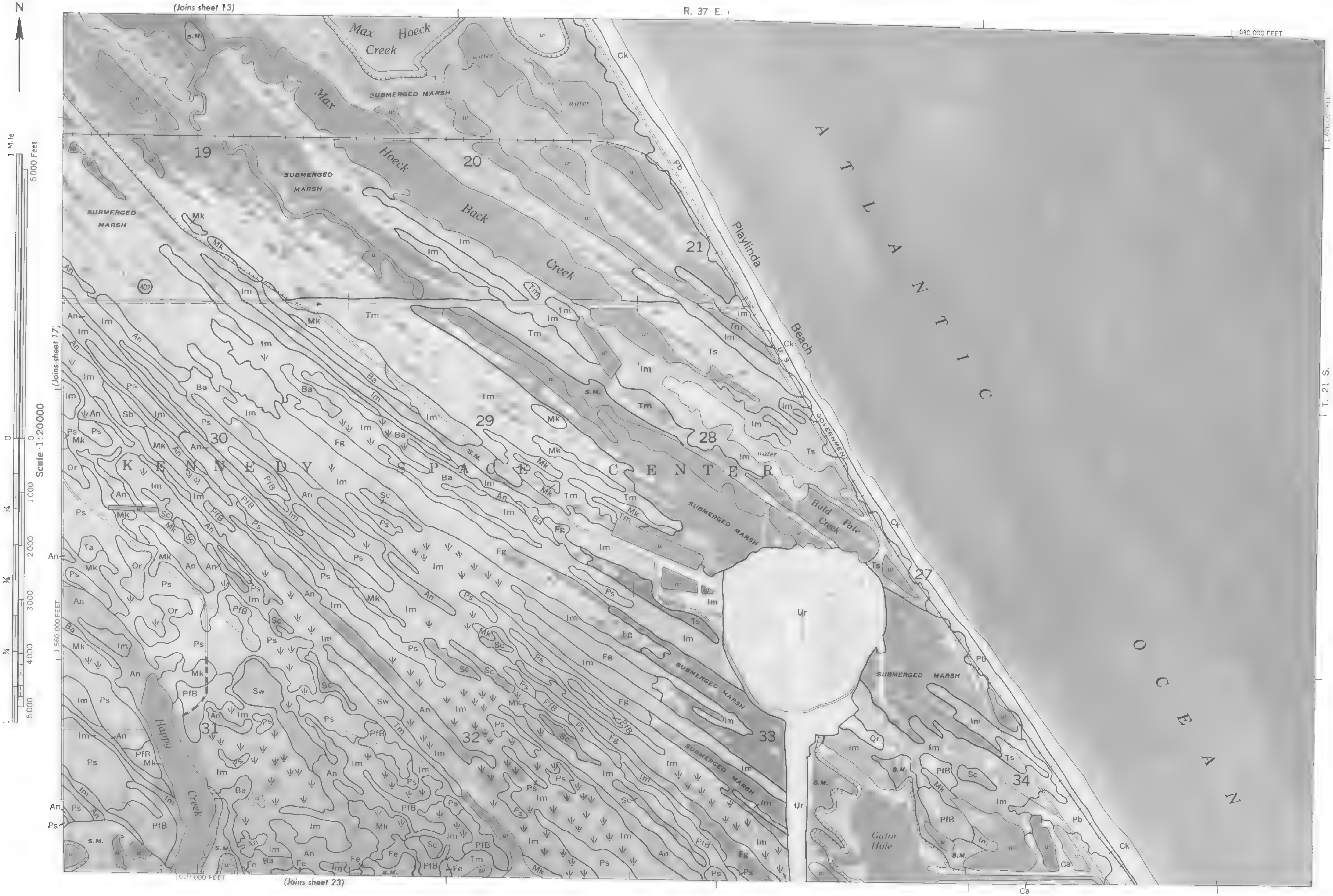

N
(Joins sheet 9)
R. 34 E.
535 000 FEET
1 570 000 FEET
Ellis Lake
SALT LAKE
LOUGHMAN LAKE
Silver Lake
Clark Lake
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
T. 21 S.
(Joins sheet 15)
(Joins sheet 19)
515 000 FEET
1 560 000 FEET
VOLUSIA COUNTY
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000

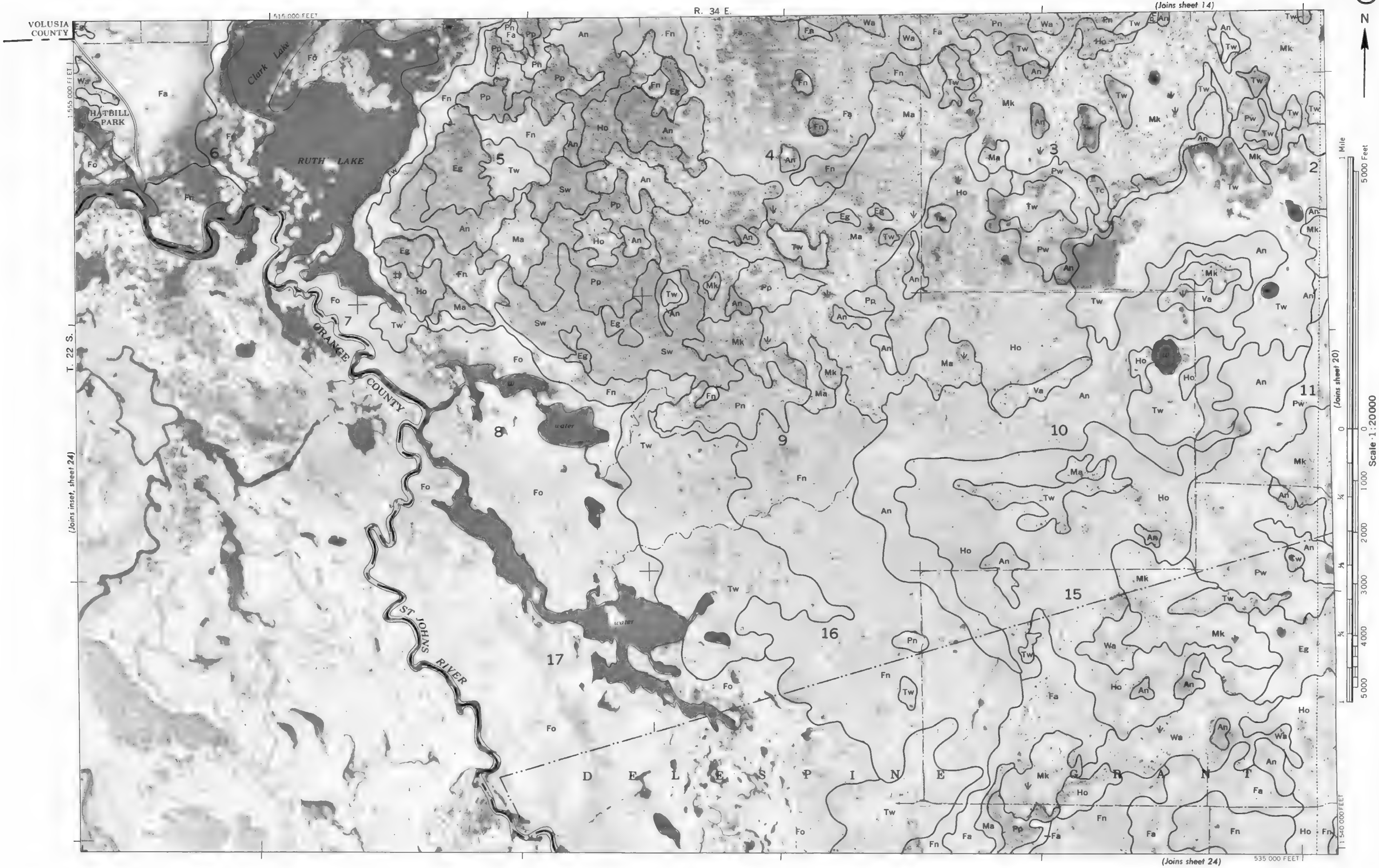

15
N
540 000 FEET
R. 34 E.
R. 35 E.
(Joins sheet 10)
1 570 000 FEET
T. 21 S.
(Joins sheet 14)
COUNTRY CLUB
INDIAN
RIVER
U S GOVERNMENT
FLORIDA
EAST
COAST
Jay Jay
La Grange
Paces Landing
SOUTH LAKE
DUNN AIRPORT
TITUSVILLE
(county seat)
Hospital
(Joins sheet 16)
1 560 000 FEET
555 000 FEET
(Joins sheet 20)
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36
1 Mile
5000 Feet
Scale 1:20000

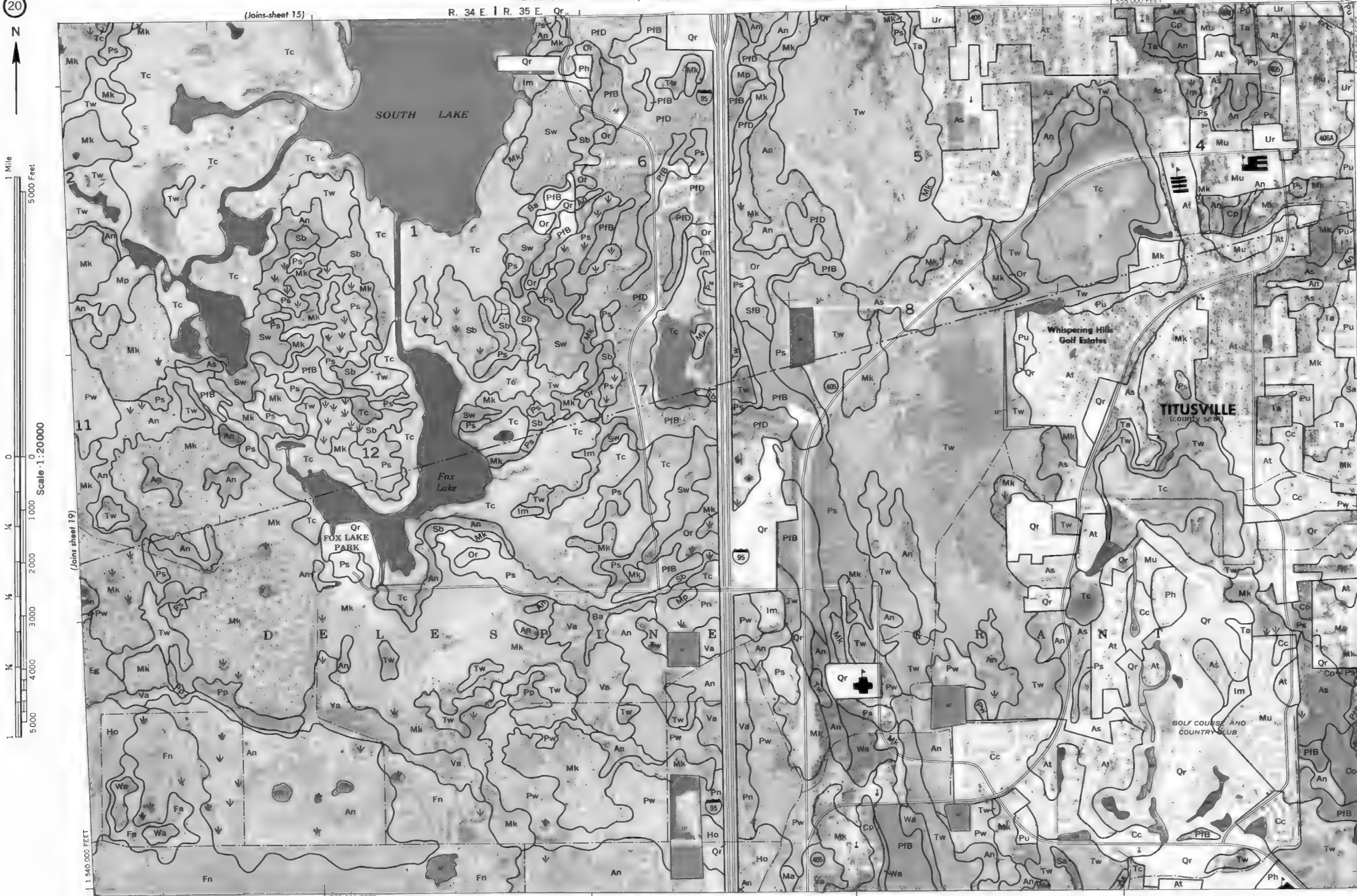
BREVARD COUNTY, FLORIDA — SHEET NUMBER 16




17
N
585 000 FEET
R. 36 E.
(Joins sheet 12)
1 570 000 FEET
T. 21 S.
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 22)
605 000 FEET
1 560 000 FEET
Wilson
KENNEDY SPACE CENTER
KENNEDY PARKWAY NORTH
GOVERNMENT
SUBMERGED MARSH
Workman Pond
Scale 1:20000
1 Mile
5000 Feet
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36


N
(Joins sheet 13)
(Joins sheet 17)
(Joins sheet 23)
R. 37 E.
T. 21 S.
680 000 FEET
1 560 000 FEET
Scale 1:20000
1 Mile
5000 Feet
Max Hoeck Creek
Max Hoeck Back Creek
SUBMERGED MARSH
Playlinda Beach
U.S. GOVERNMENT
Bald Pate Creek
Happy Creek
Gator Hole
KENNEDY SPACE CENTER
ATLANTIC OCEAN
402
19
20
21
27
28
29
30
31
32
33
34

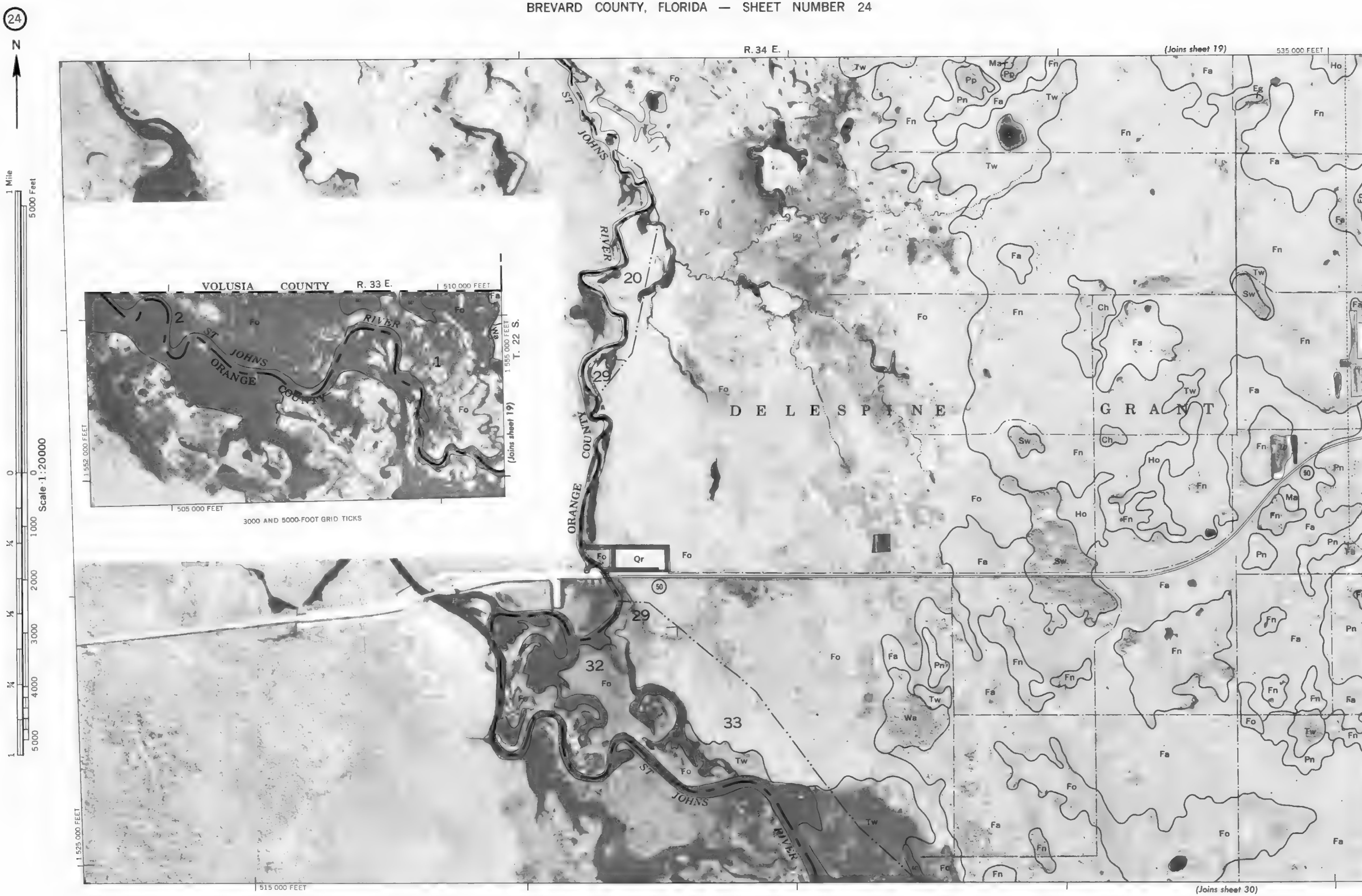

19
N
R. 34 E.
T. 22 S.
(Joins sheet 14)
(Joins sheet 20)
(Joins sheet 24)
(Joins inset, sheet 24)
515 000 FEET
1 555 000 FEET
1 540 000 FEET
535 000 FEET
VOLUSIA COUNTY
HATBILL PARK
Clark Lake
RUTH LAKE
ORANGE COUNTY
ST JOHNS RIVER
water
D E L E S P I N E G R A N T
Scale 1:20000
1 Mile
5000 Feet

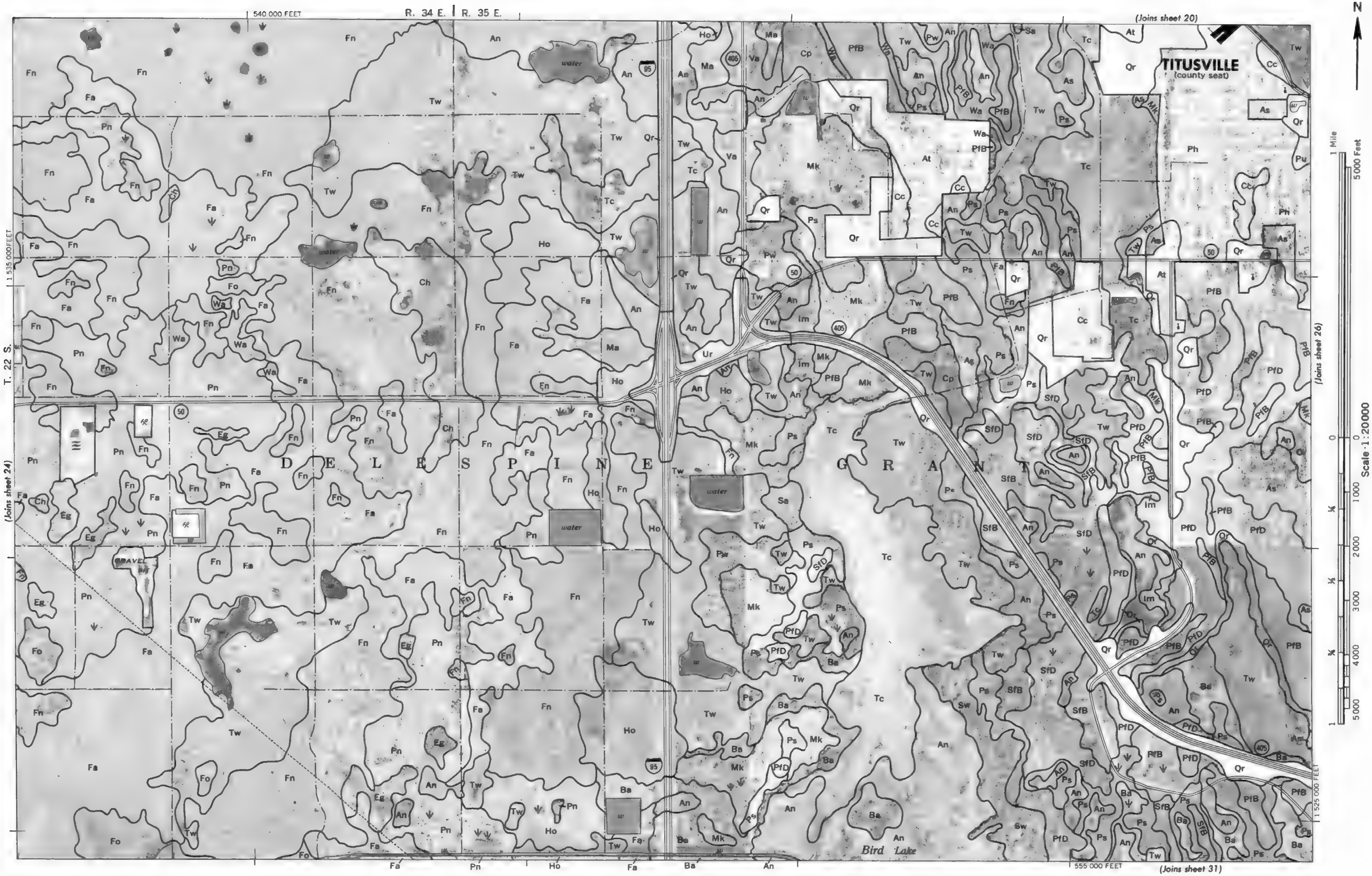

20
N
(Joins sheet 15)
R. 34 E. | R. 35 E.
555 000 FEET
1 555 000 FEET
SOUTH LAKE
Fox Lake
FOX LAKE PARK
Whispering Hills Golf Estates
TITUSVILLE
(county seat)
GOLF COURSE AND COUNTRY CLUB
D E L E S P I N E G R A N T
T. 22 S.
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 25)
540 000 FEET
1 540 000 FEET
1 Mile
5000 Feet
Scale 1:20000

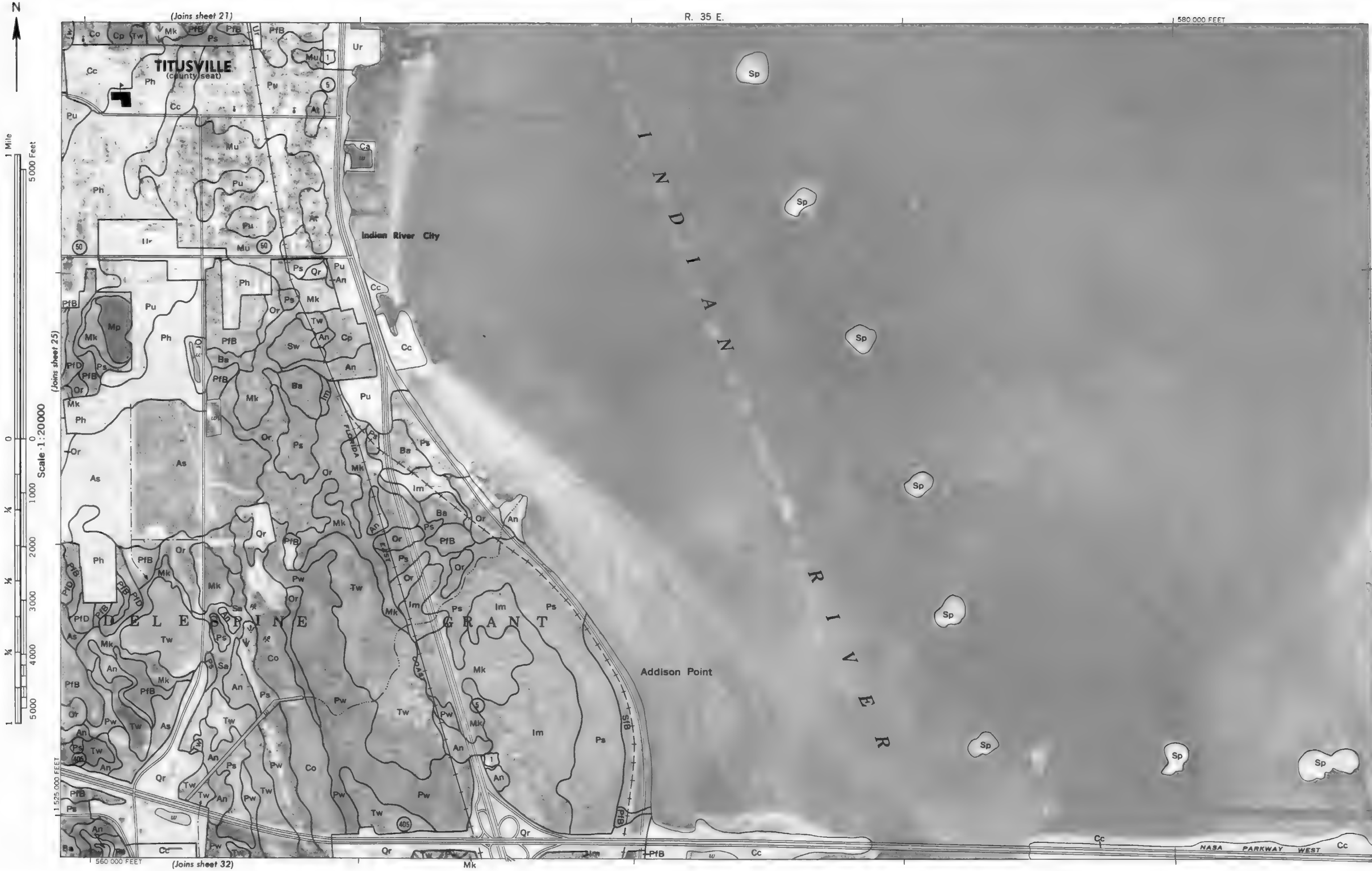

21
N
560 000 FEET
1 555 000 FEET
R. 35 E. | R. 36 E.
(Joins sheet 16)
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 26)
580 000 FEET
1 540 000 FEET
T. 22 S.
KENNEDY SPACE CENTER
SUBMERGED MARSH
water
Brock Creek
BROCK FLATS
INDIAN RIVER
TITUSVILLE
(county seat)
Titusville High School
FLORIDA EAST COAST
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000

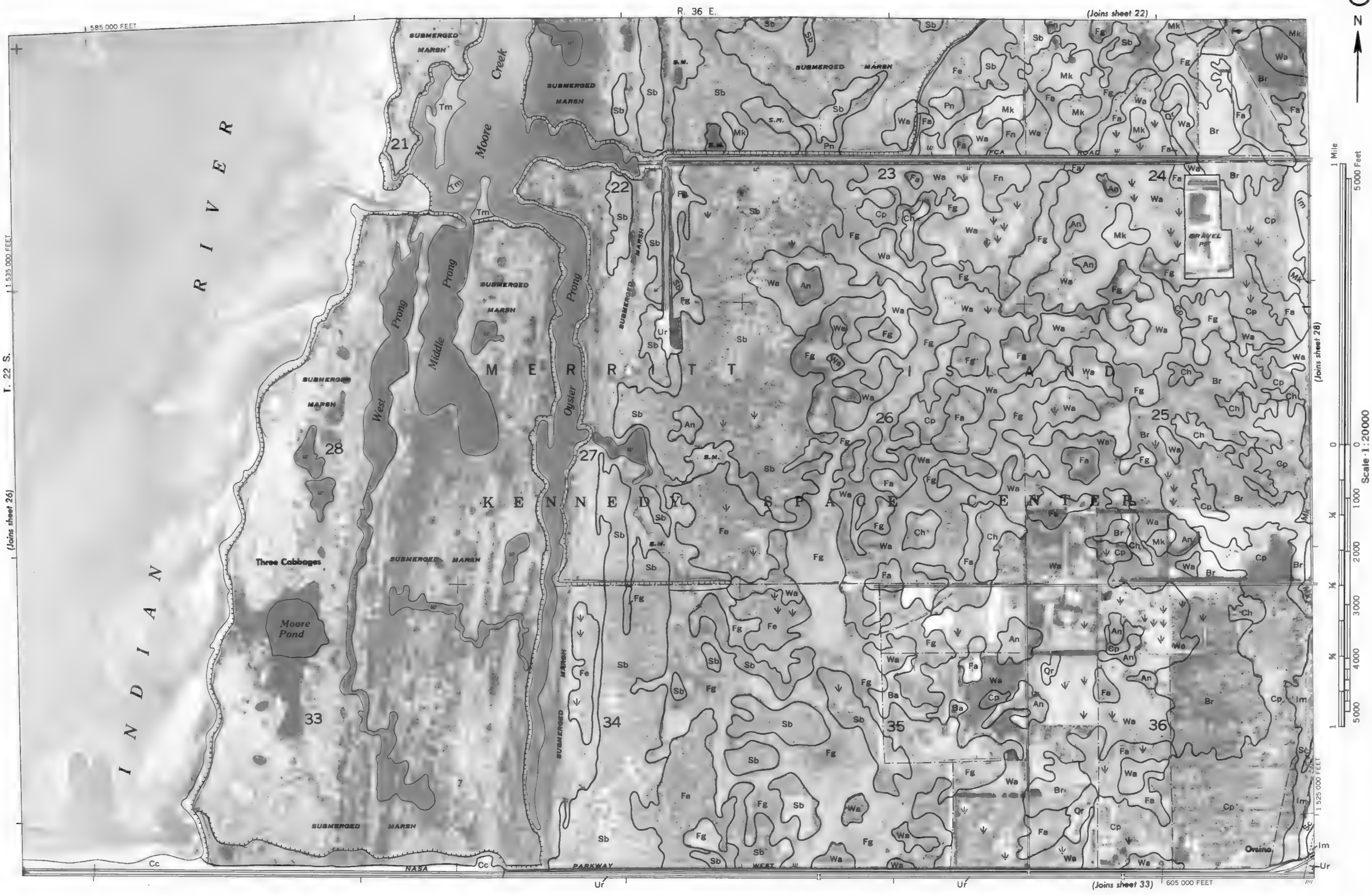

22
N
(Joins sheet 17)
R. 36 E.
605 000 FEET
1 555 000 FEET
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 27)
585 000 FEET
1 540 000 FEET
T. 22 S.
Peacocks Pocket
SUBMERGED MARSH
water
BROCK FLATS
INDIAN RIVER
Stony Island
Skunk Island
Green Bush Point
BANANA CREEK
KENNEDY SPACE CENTER
Palmo Crystal
Hubs Landing
Cedar Hammond
Seven Pines Cr.
MERRITT ISLAND
Moore Creek
Jones Cr.
KENNEDY PARKWAY
GOVERNMENT NORTH
Futch Cove
Workman Pond
S.M.
1
2
3
4
5
9
10
11
12
13
14
15
16


23
N
610 000 FEET
R. 37 E.
(Joins sheet 18)
1 555 000 FEET
T. 22 S.
(Joins sheet 22)
(Joins inset, sheet 29)
(Joins sheet 28)
630 000 FEET
1 540 000 FEET
ATLANTIC OCEAN
BANANA CREEK
Big Island
Futch Cove
Picnic Island
Ross Cutoff
Ross Creek
Billy Joe Point
Cochran Cove
East Creek
West Creek
Broadaxe Ridge
Broadaxe Creek
Broadaxe Point
Gator Hole
KENNEDY SPACE CENTER
Pepper Flats
Pepper Hammock
Jack Island
Pintail Creek
Gulbranson Creek
Davis Cut
Jack Davis Cut
Devils Elbow
West Pepper Creek
MERRITT ISLAND
BANANA RIVER
W. Conrad Cr
E. Conrad Cr
Drainout Cr
SUBMERGED MARSH
NORTH PARKWAY
GOVERNMENT
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000


N
1 Mile
5000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000
R. 34 E.
(Joins sheet 19)
535 000 FEET
T. 22 S.
(Joins sheet 25)
(Joins sheet 30)
515 000 FEET
1 525 000 FEET
1 535 000 FEET
ST JOHNS RIVER
ORANGE COUNTY
DELESPINE GRANT
VOLUSIA COUNTY
R. 33 E.
510 000 FEET
505 000 FEET
1 555 000 FEET
1 552 000 FEET
(Joins sheet 19)
3000 AND 5000-FOOT GRID TICKS
20
29
32
33
50
Fo
Fn
Fa
Tw
Pp
Pn
Ma
Ho
Eg
Sw
Ch
Wa
Qr

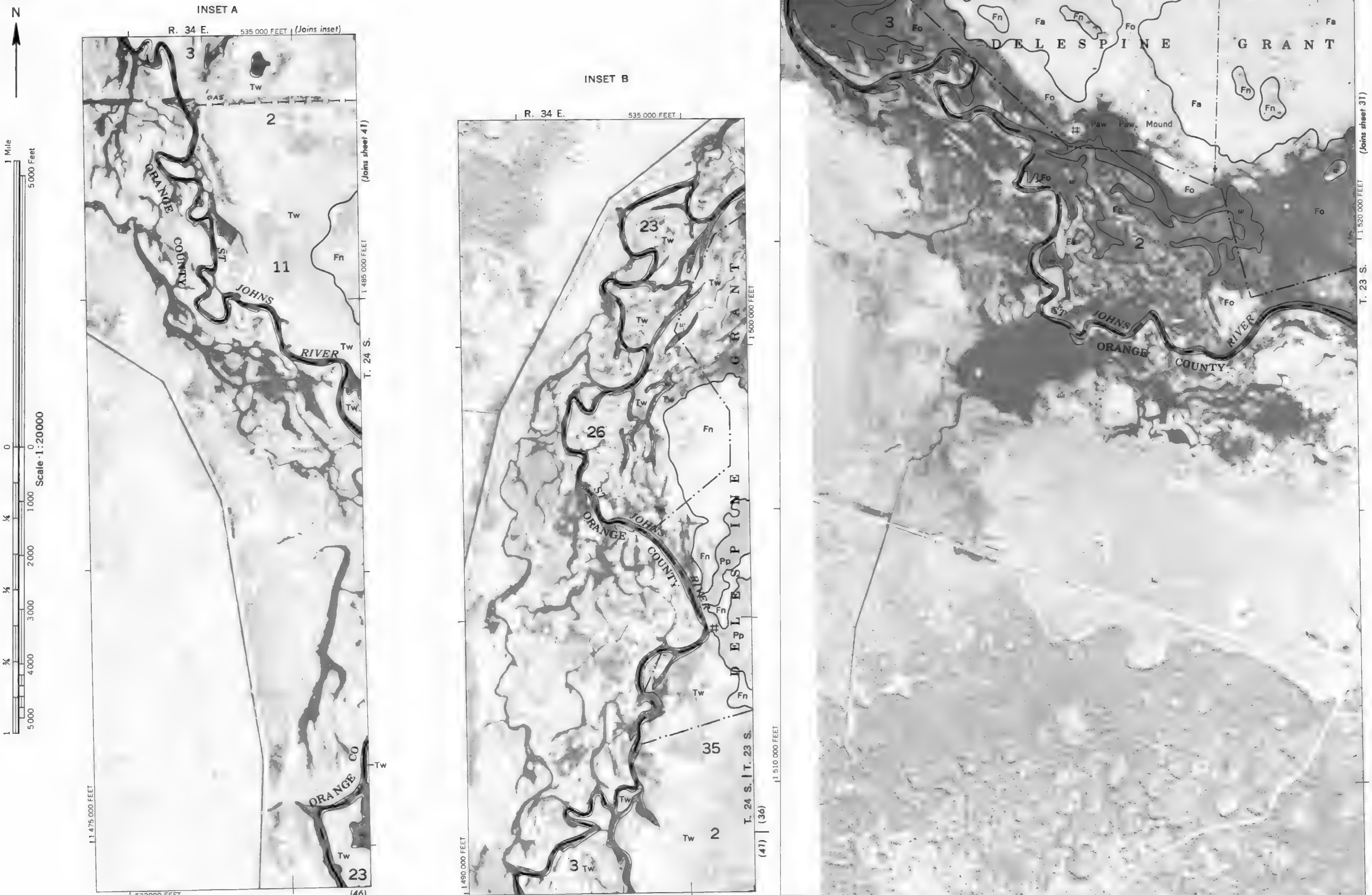

540 000 FEET
R. 34 E.
R. 35 E.
(Joins sheet 20)
TITUSVILLE
(county seat)
N
1 535 000 FEET
T. 22 S.
(Joins sheet 24)
(Joins sheet 26)
D E L E S P I N E
G R A N T
water
GRAVEL
Bird Lake
1 525 000 FEET
555 000 FEET
(Joins sheet 31)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 21)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 32)
R. 35 E.
T. 22 S.
580 000 FEET
560 000 FEET
1 535 000 FEET
1 525 000 FEET
TITUSVILLE
(county seat)
Indian River City
INDIAN RIVER
DE LESPINE GRANT
Addison Point
FLORIDA EAST COAST
NASA PARKWAY WEST

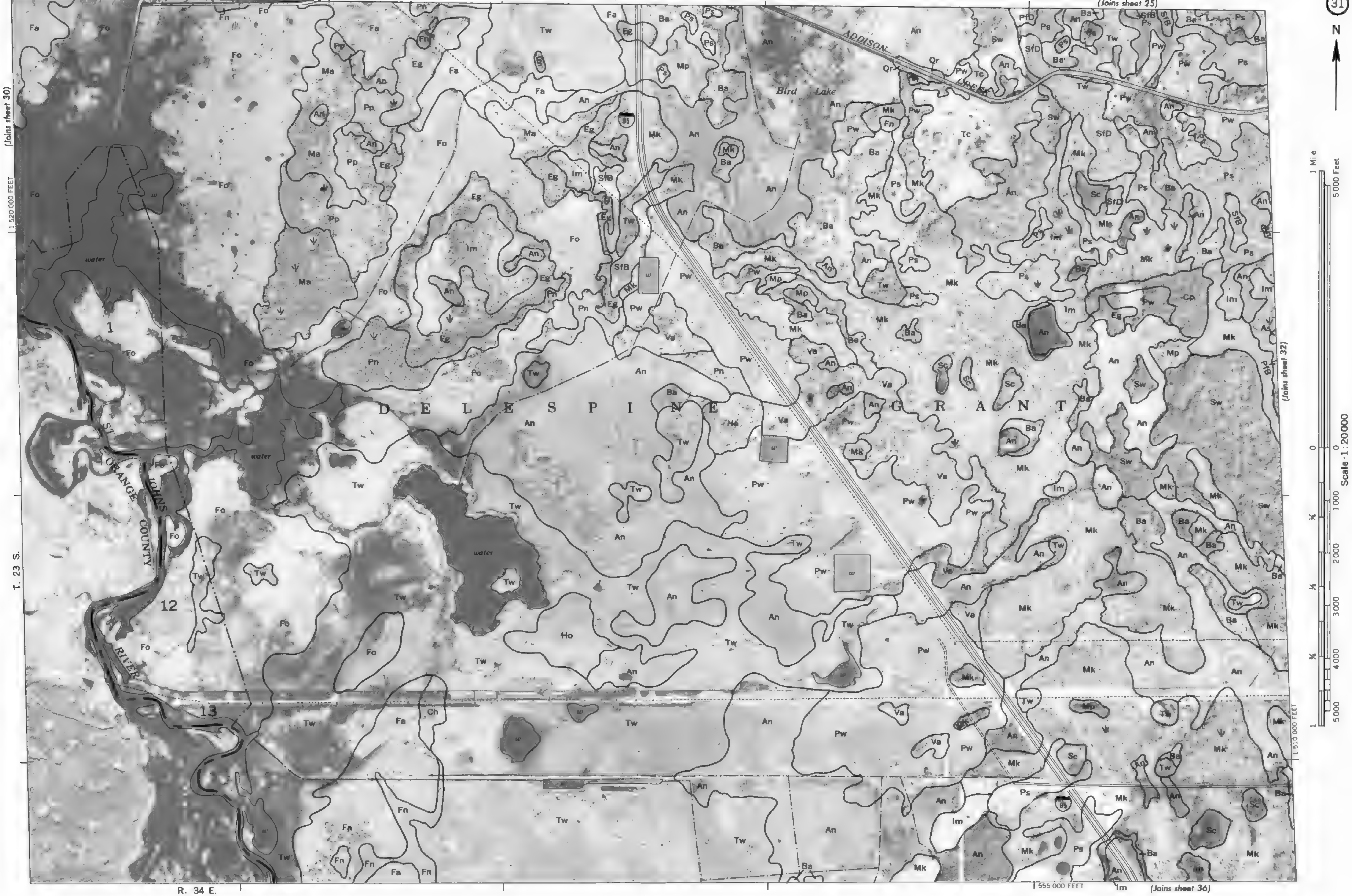

27
N
R. 36 E.
(Joins sheet 22)
(Joins sheet 28)
(Joins sheet 33)
(Joins sheet 26)
585 000 FEET
605 000 FEET
1 535 000 FEET
1 525 000 FEET
T. 22 S.
INDIAN RIVER
MERRITT ISLAND
KENNEDY SPACE CENTER
Moore Creek
West Prong
Middle Prong
Oyster Prong
Moore Pond
Three Cabbages
SUBMERGED MARSH
GRAVEL PIT
FCA ROAD
NASA PARKWAY WEST
Orsino
21
22
23
24
25
26
27
28
33
34
35
36
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 23)
R. 37 E.
630 000 FEET
1 535 000 FEET
1 525 000 FEET
610 000 FEET
T. 22 S.
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 33)
(Joins sheet 34)
MERRITT ISLAND
KENNEDY SPACE CENTER
BANANA RIVER
Tea Creek Cutoff
Tea Creek
Tea Hammock
Futch Point
GRAVEL PIT
SUBMERGED MARSH
MARSH
FCA ROAD
GOVERNMENT
U.S.
NORTH
PARKWAY
KENNEDY
NASA PARKWAY EAST
Orsino
water
19
20
21
22
23
26
27
28
29
30
31
32
33
35


29
N
635 000 FEET (Joins inset)
water
SUBMERGED MARSH
23
24
Ca
Pb
Ck
Cc
Ur
w
1 535 000 FEET
Road Creek
SUBMERGED MARSH
Harrison
water
Cc
26
T. 22 S.
Ps
25
CAPE KENNEDY AIR FORCE STATION
We
Sp
(Joins sheet 28)
ROAD
water
CAPE
36
31
35
Ur
We
(Joins sheet 35)
R. 37 E.
R. 38 E.
ATLANTIC OCEAN
633 000 FEET
R. 37 E.
1 550 000 FEET
Pw
11
12
13
14
False Cape
KENNEDY SPACE CENTER
(Joins sheet 23)
U S GOVERNMENT
Tm
SUBMERGED MARSH
1 525 000 FEET
1 540 000 FEET
638 000 FEET
(Joins upper left)
655 000 FEET
1 Mile
5000 Feet
Scale 1:20000



3000 AND 5000-FOOT GRID TICKS


31
N
(Joins sheet 25)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 36)
540 000 FEET
555 000 FEET
1 520 000 FEET
1 510 000 FEET
T. 23 S.
R. 34 E.
ADDISON
CREEK
Bird Lake
ST. JOHNS RIVER
ORANGE COUNTY
DELESPINE GRANT
water
95
1
12
13
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

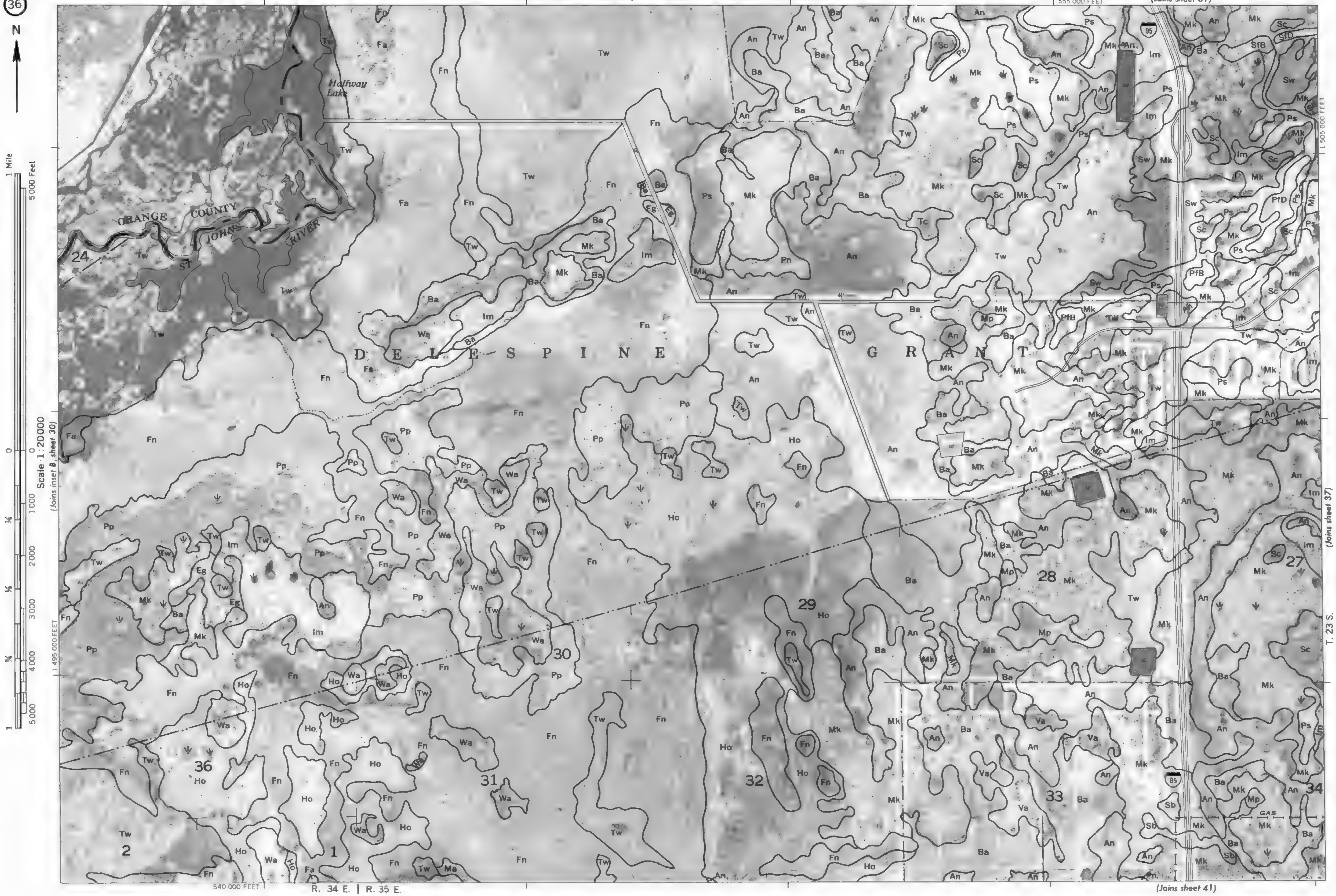

(Joins sheet 26)
580 000 FEET
NASA PARKWAY WEST
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
T. 23 S.
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 37)
560 000 FEET
1 510 000 FEET
1 520 000 FEET
R. 35 E. | R. 36 E.
TITUSVILLE-COCOA AIRPORT
Burns Hammock
Bellwood
Delespine
DELESPINE
GRANT
INDIAN RIVER
GRAVEL PIT
FLORIDA EAST COAST
Qr
Ur
PfB
PfD
Ps
Pw
Tw
Mk
Sb
Sc
Ba
Cc
Co
Ca
As
An
Im
Ta
Sw
Mp
Sa
Mu
Pu
Cp
Ma
Sp
Or

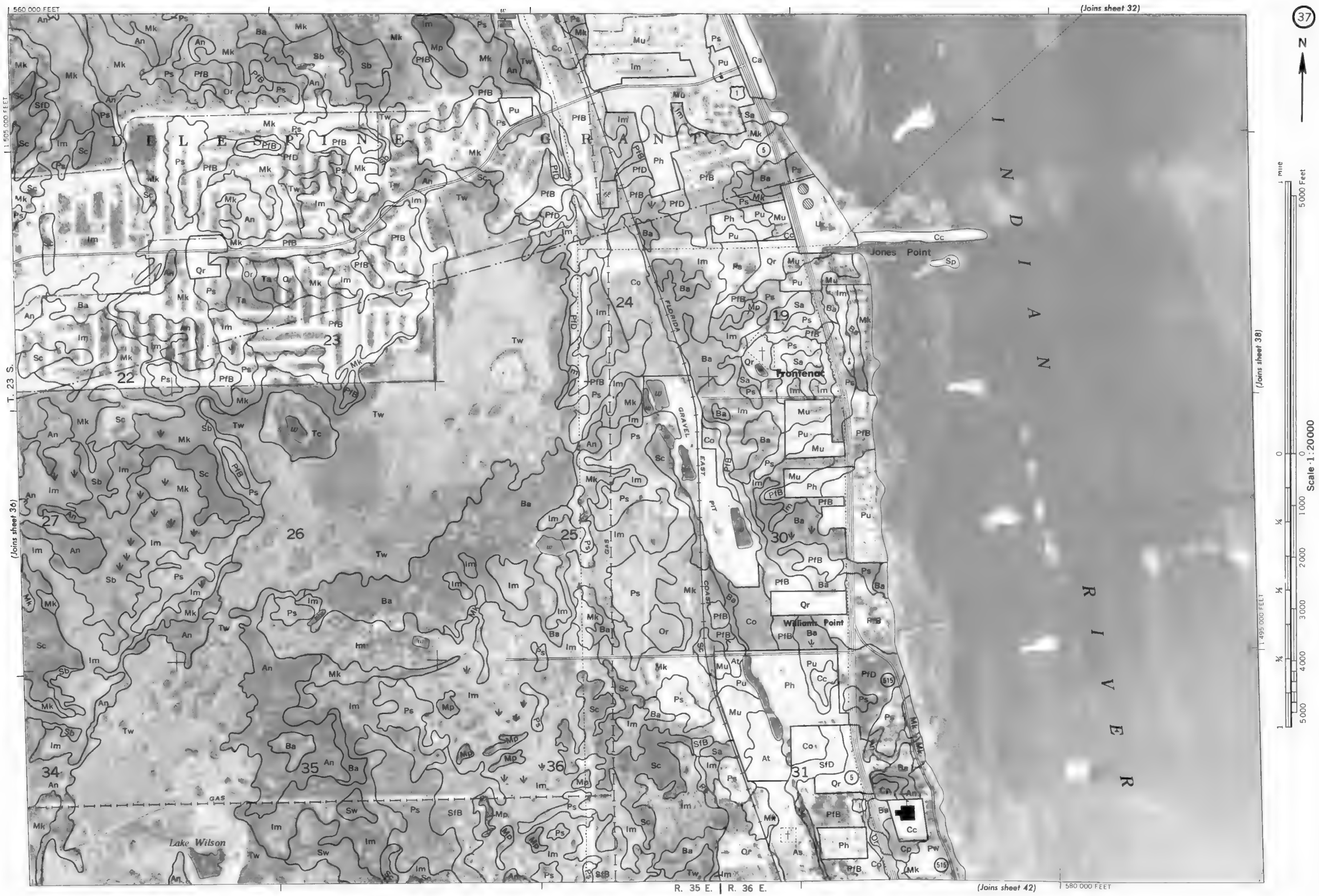

33
N
585 000 FEET
1 520 000 FEET
1 510 000 FEET
605 000 FEET
R. 36 E.
R. 37 E.
(Joins sheet 27)
(Joins sheet 28)
(Joins sheet 34)
(Joins sheet 38)
(Joins sheet 32)
T. 23 S.
INDIAN RIVER
MERRITT ISLAND
KENNEDY SPACE CENTER
NASA PARKWAY WEST
KENNEDY PARKWAY SOUTH
Orsino
SUBMERGED MARSH
Pine Island Basin
Pine Island
Pine Island Creek
GRAVEL PIT
SAMS CREEK
1 Mile
5000 Feet
Scale 1:20000

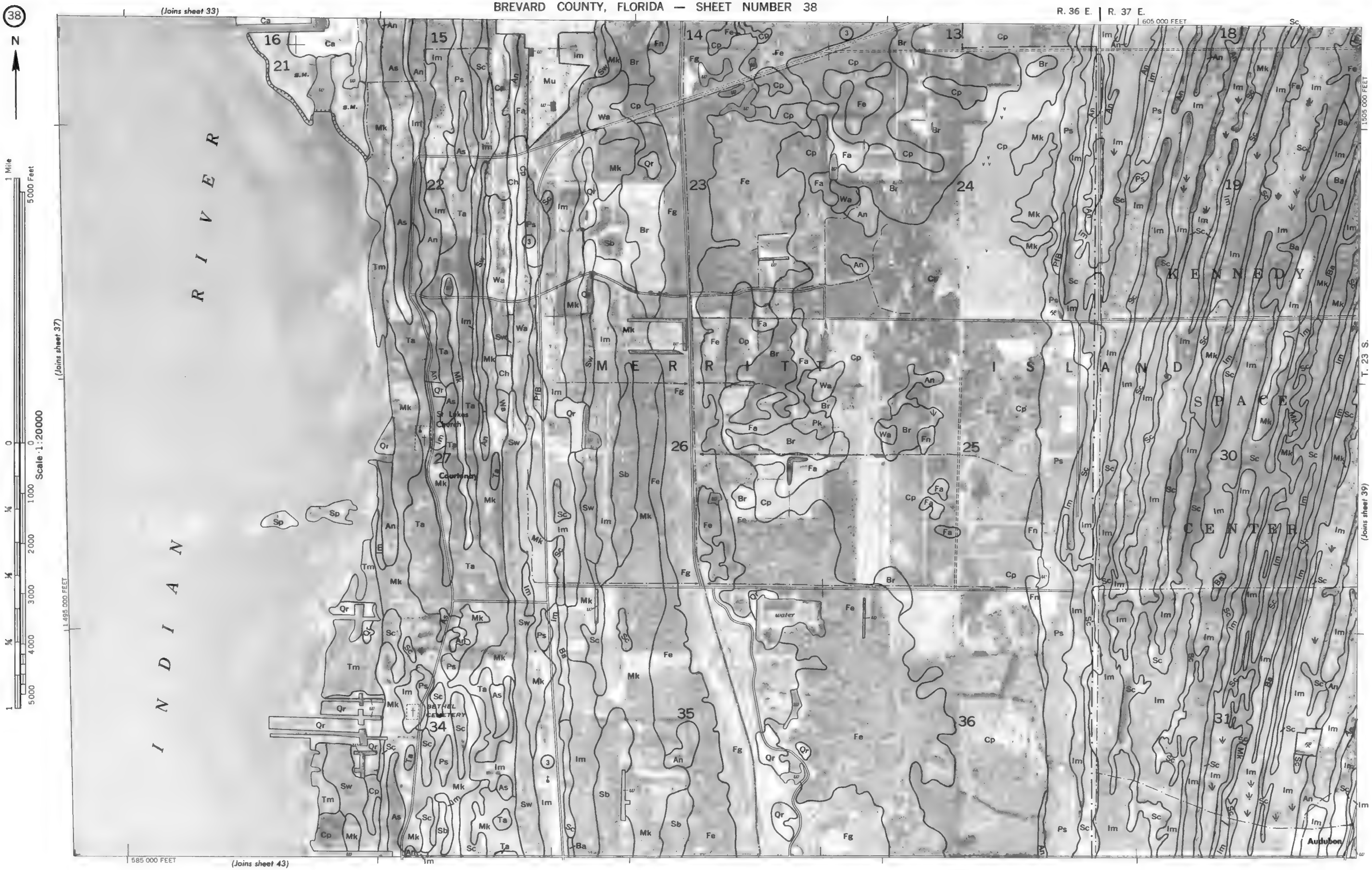
34

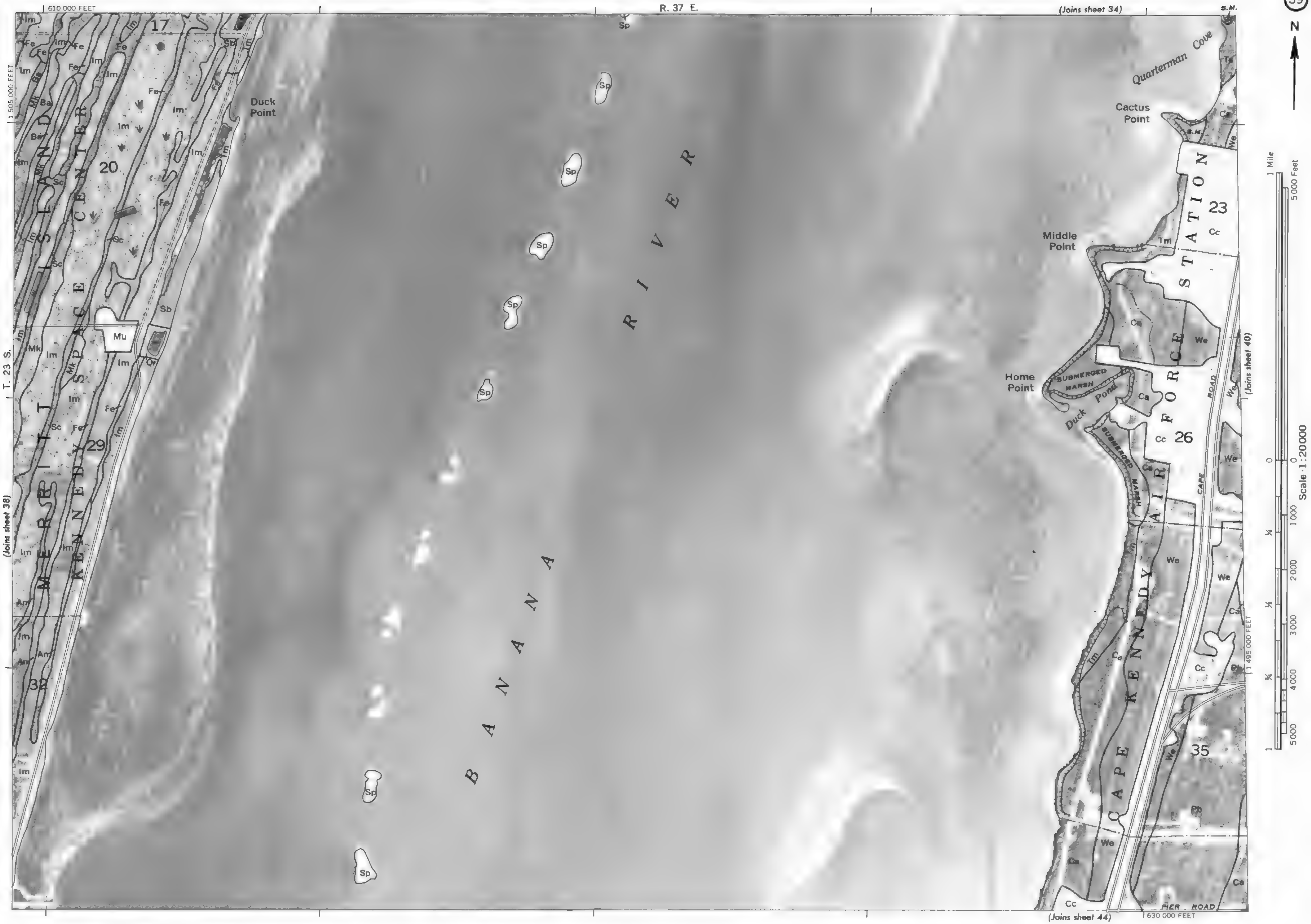

(Joins sheet 28)
R. 37 E.
630 000 FEET
1 520 000 FEET
(Joins sheet 35)
(Joins sheet 33)
(Joins sheet 39)
610 000 FEET
1 510 000 FEET
T. 23 S.
Scale 1:20000
1 Mile
5000 Feet
MERRITT ISLAND
KENNEDY SPACE CENTER
BANANA RIVER
Buck Creek
SUBMERGED MARSH
NASA PARKWAY EAST
U S GOVERNMENT
water


35
N
635 000 FEET
R. 37 E. | R. 38 E.
(Joins sheet 29)
1 520 000 FEET
T. 23 S.
(Joins sheet 34)
(Joins sheet 40)
655 000 FEET
1 510 000 FEET
BANANA RIVER
ATLANTIC OCEAN
CAPE KENNEDY AIR FORCE STATION
CAPE ROAD
CENTRAL CONTROL ROAD
ROAD
Peterson Point
SUBMERGED MARSH
water
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Ur
Qr
We
Ca
Cc
Ck
Tm
Pb
Ts
1
5
6
7
8
12
13
16
17
18


36
N
1 Mile
5000 Feet
Scale 1:20000
(Joins inset B, sheet 30)
(Joins sheet 31)
555 000 FEET
1 505 000 FEET
(Joins sheet 37)
T. 23 S.
1 495 000 FEET
540 000 FEET
R. 34 E.
R. 35 E.
(Joins sheet 41)
Halfway Lake
ORANGE COUNTY
ST. JOHNS RIVER
DELESPINE
GRANT
GAS
95


37
N
560 000 FEET
(Joins sheet 32)
1 505 000 FEET
D E L E S P I N E   G R A N T
I N D I A N   R I V E R
Jones Point
Frontenac
Williams Point
Lake Wilson
FLORIDA EAST COAST
GRAVEL PIT
GAS
T. 23 S.
(Joins sheet 36)
(Joins sheet 38)
1 495 000 FEET
R. 35 E. | R. 36 E.
(Joins sheet 42)
580 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000


38
N
(Joins sheet 33)
R. 36 E. | R. 37 E.
605 000 FEET
1 505 000 FEET
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 43)
585 000 FEET
1 495 000 FEET
T. 23 S.
1 Mile
5000 Feet
Scale 1:20000
INDIAN RIVER
MERRITT ISLAND
KENNEDY SPACE CENTER
St Lukes Church
Courtenay
BETHEL CEMETERY
Audubon
water
14
13
15
16
18
19
21
22
23
24
25
26
27
30
31
34
35
36


610 000 FEET
R. 37 E.
(Joins sheet 34)
1 505 000 FEET
T. 23 S.
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 44)
630 000 FEET
1 495 000 FEET
Duck Point
Quarterman Cove
Cactus Point
Middle Point
Home Point
Duck Pond
SUBMERGED MARSH
BANANA RIVER
MERRITT ISLAND
KENNEDY SPACE CENTER
CAPE KENNEDY AIR FORCE STATION
CAPE ROAD
PIER ROAD
17
20
29
32
23
26
35
N
Scale 1:20000
1 Mile
5000 Feet

40
N
(Joins sheet 35)
R. 37 E. | R. 38 E.
655 000 FEET
1 505 000 FEET
(Joins sheet 39)
T. 23 S.
1 495 000 FEET
(Joins sheet 45)
635 000 FEET
1 Mile
5000 Feet
Scale 1:20000
CAPE KENNEDY AIR FORCE STATION
CAPE ROAD
CENTRAL CONTROL ROAD
ICBM ROAD
FLIGHT CONTROL ROAD
LIGHTHOUSE ROAD
PIER ROAD
Lighthouse
SUBMERGED MARSH
Cape Kennedy
CANAVERAL BIGHT
ATLANTIC OCEAN
13
17
18
19
20
21
24
25
28
29
30
31
32
36
Ca
Cc
Ck
Pb
Qr
Ur
We


41
540 000 FEET
R. 34 E. | R. 35 E.
(Joins sheet 36)
(Joins inset A, sheet 30)
(Joins inset B, sheet 30)
T. 23 S.
T. 24 S.
N
1 485 000 FEET
(Joins sheet 42)
Scale 1:20000
1 Mile
5000 Feet
1 475 000 FEET
(Joins sheet 46)
560 000 FEET
ST JOHNS RIVER
ORANGE COUNTY
Halfway Lake
water
GAS
95

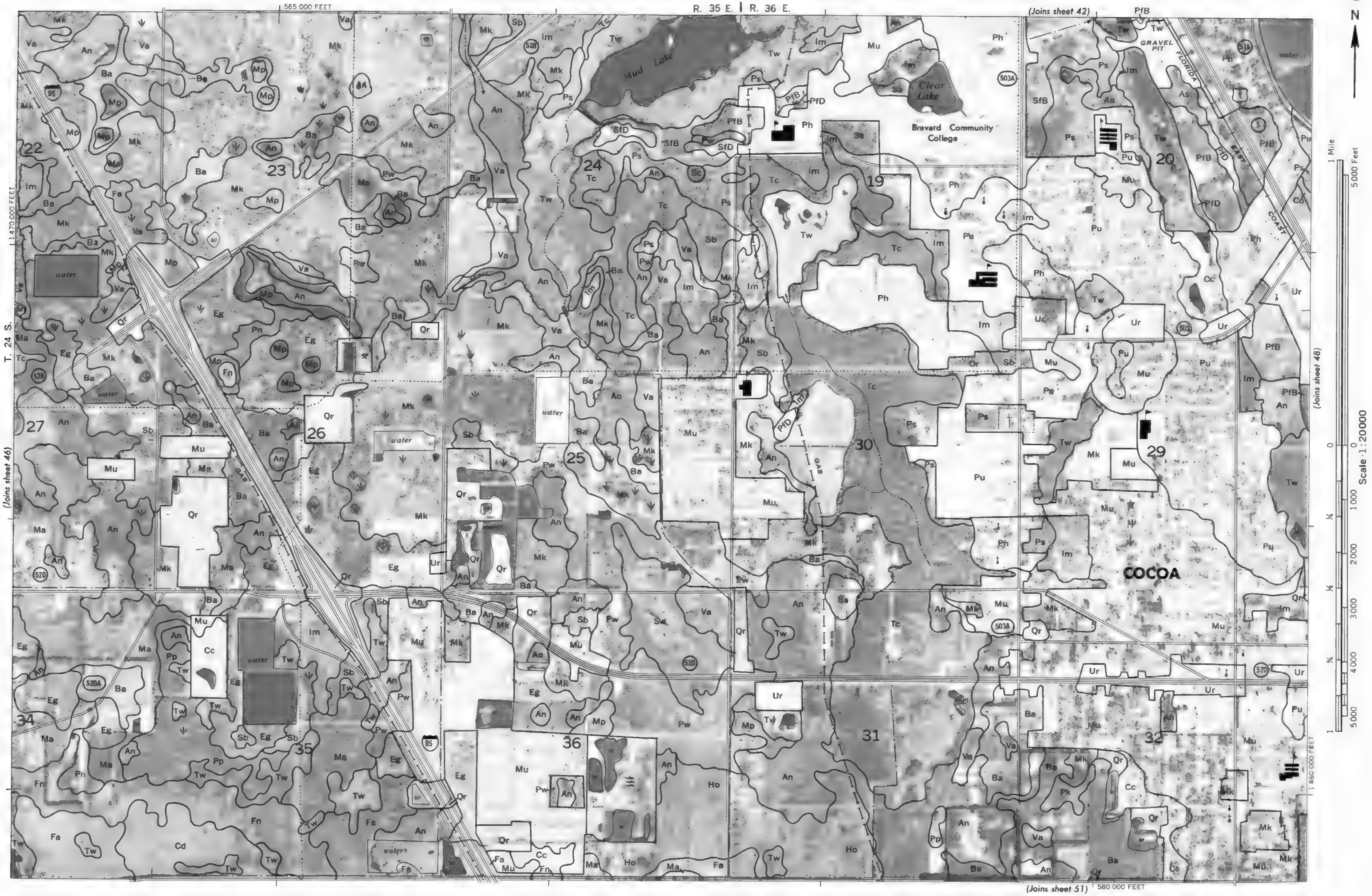
BREVARD COUNTY, FLORIDA — SHEET NUMBER 42


43
N
585 000 FEET
1 490 000 FEET
R. 36 E. | R. 37 E.
(Joins sheet 38)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 48)
(Joins sheet 49)
T. 24 S.
605 000 FEET
1 475 000 FEET
INDIAN RIVER
BANANA RIVER
MERRITT ISLAND
KENNEDY SPACE CENTER
SYKES CREEK
BARGE CANAL
SUBMERGED MARSH
Indianola
Audubon
Scale 1:20000
1 Mile
5000 Feet
BREVARD COUNTY, FLORIDA NO. 43

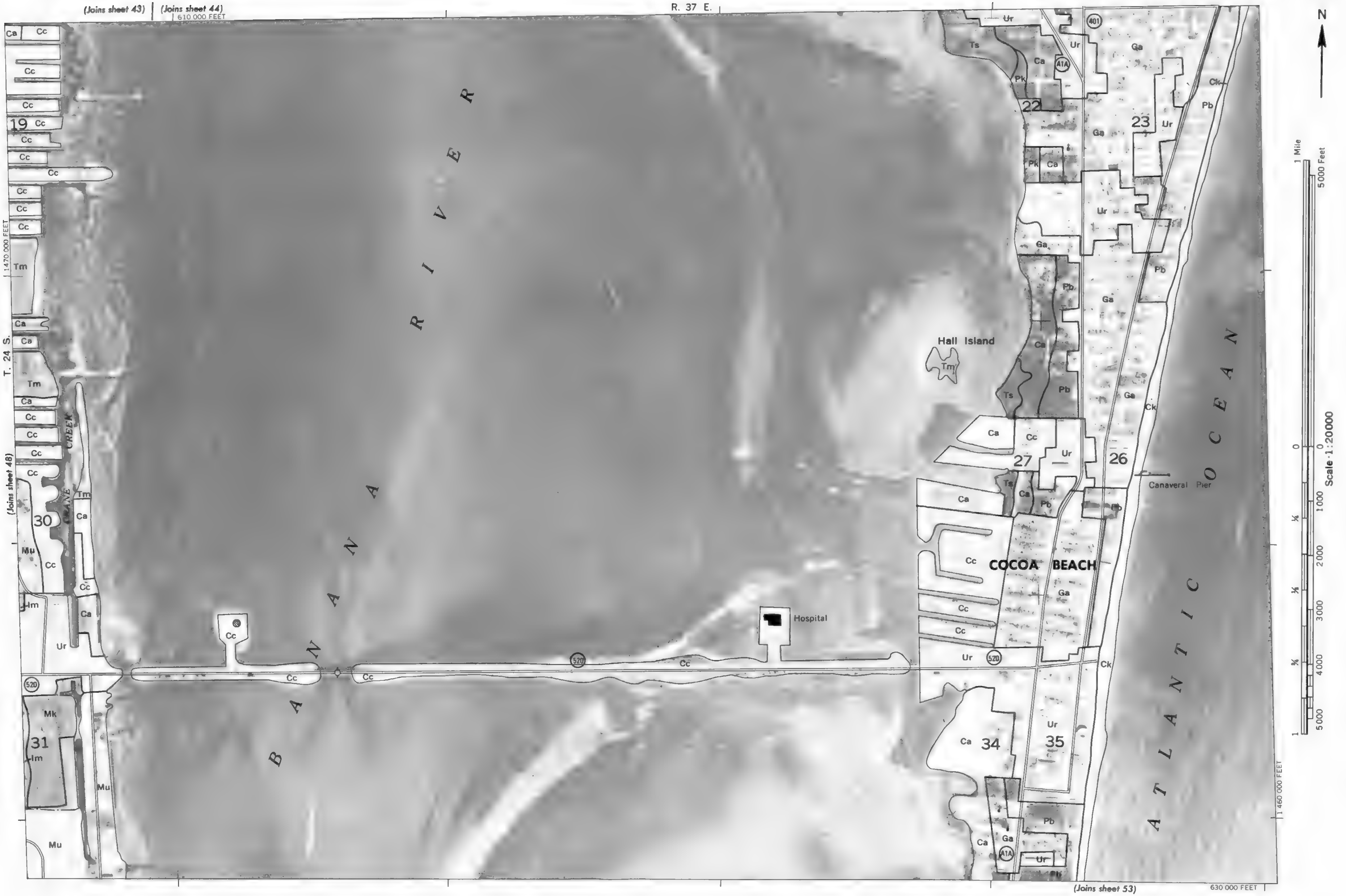

N
1 Mile
5 000 Feet
0
¼
½
¾
1
0
1000
2000
3000
4000
5000
Scale 1:20000
(Joins sheet 39)
R. 37 E.
630 000 FEET
1 490 000 FEET
T. 24 S.
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 49)
610 000 FEET
1 475 000 FEET
BANANA RIVER
CAPE KENNEDY AIR FORCE STATION
CAPE ROAD
TURN BASIN
TIDAL LOCK
BARGE CANAL
Port Canaveral
Artesia
CAPE CANAVERAL
THE JETTIES
ATLANTIC OCEAN
401
A1A
1
2
11
12
14
15
Sp
Cc
Ca
Pb
Qr
Ur
Tm
Ga
Wn
Ck
Ta
Pk

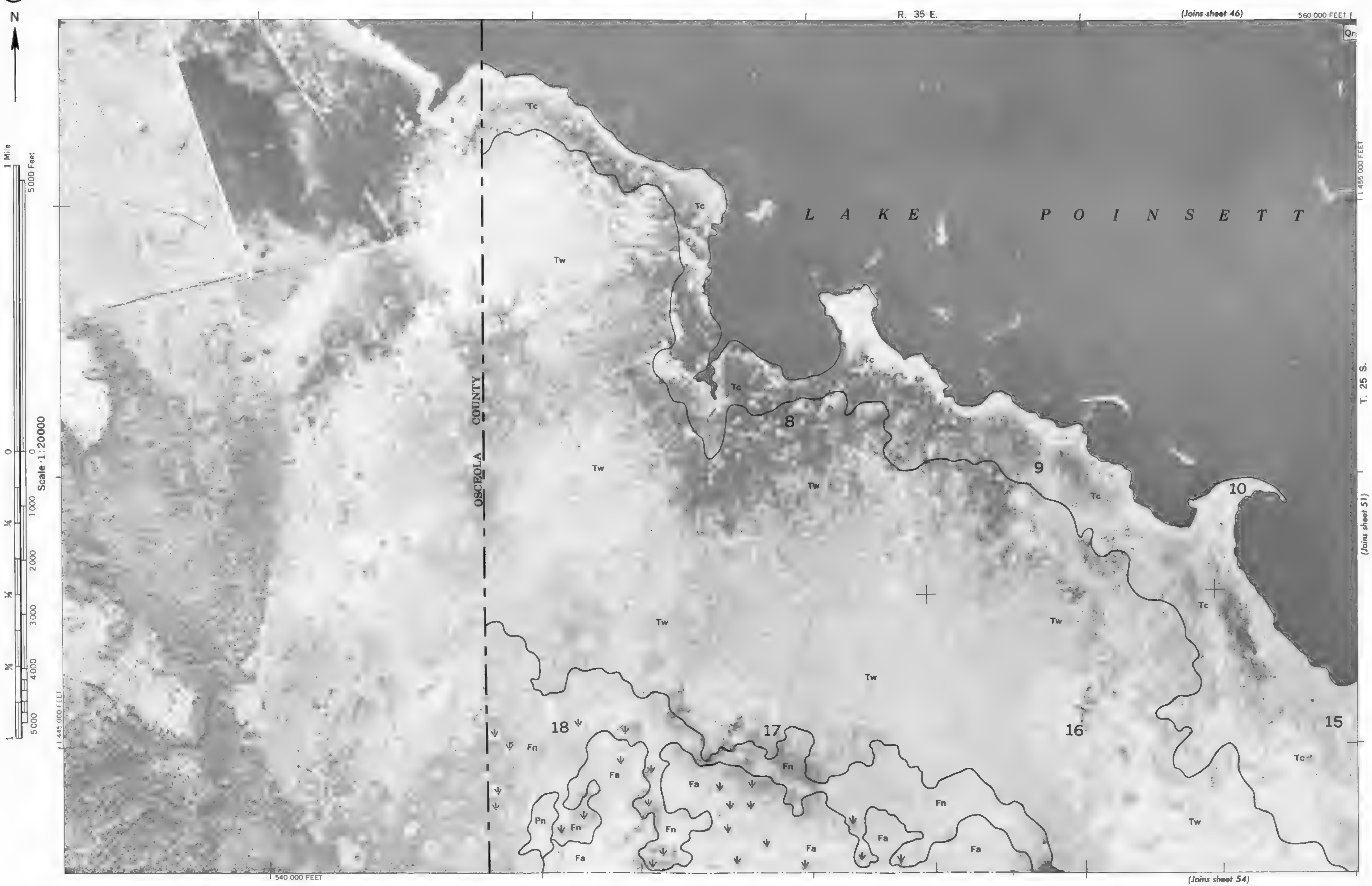

(Joins sheet 40)
635 000 FEET
R. 37 E.
R. 38 E.
N
1 490 000 FEET
T. 24 S.
(Joins sheet 44)
CAPE KENNEDY AIR FORCE STATION
Ur
Ca
Cc
Pb
Ck
Qr
w
1
6
12
CANAVERAL BIGHT
ATLANTIC OCEAN
THE JETTIES
1 480 000 FEET
655 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

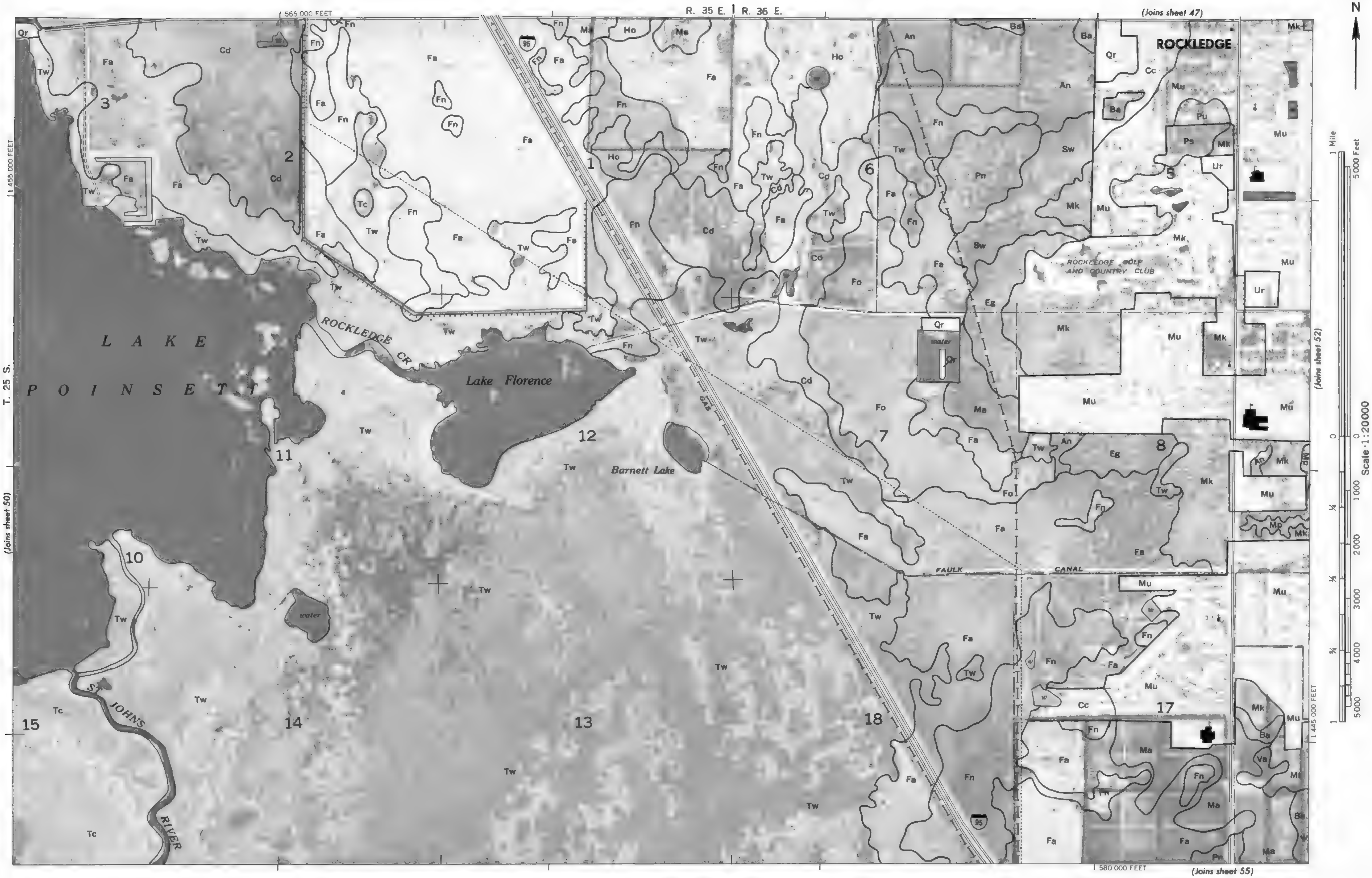

46
N
(sh 30 Inset A)
(Joins sheet 41)
R. 34 E.
R. 35 E.
560 000 FEET
1 470 000 FEET
T. 24 S.
(Joins sheet 47)
540 000 FEET
1 460 000 FEET
(Joins sheet 50)
1 Mile
5000 Feet
Scale 1:20000
ST JOHNS RIVER
ORANGE COUNTY
water
LONE CABBAGE CAMP
520
528
95
19
20
21
22
24
27
28
29
30
32
33
34
POINSETT LODGE
LAKE POINSETT
OSCEOLA CO


565 000 FEET
R. 35 E. | R. 36 E.
(Joins sheet 42)
N
Mud Lake
Clear Lake
Brevard Community College
GRAVEL PIT
FLORIDA EAST COAST
1 470 000 FEET
T. 24 S.
(Joins sheet 46)
(Joins sheet 48)
COCOA
GAS
water
1 Mile
5000 Feet
Scale 1:20000
1 460 000 FEET
(Joins sheet 51)
580 000 FEET
19
20
22
23
24
25
26
27
29
30
31
32
34
35
36

BREVARD COUNTY, FLORIDA — SHEET NUMBER 48

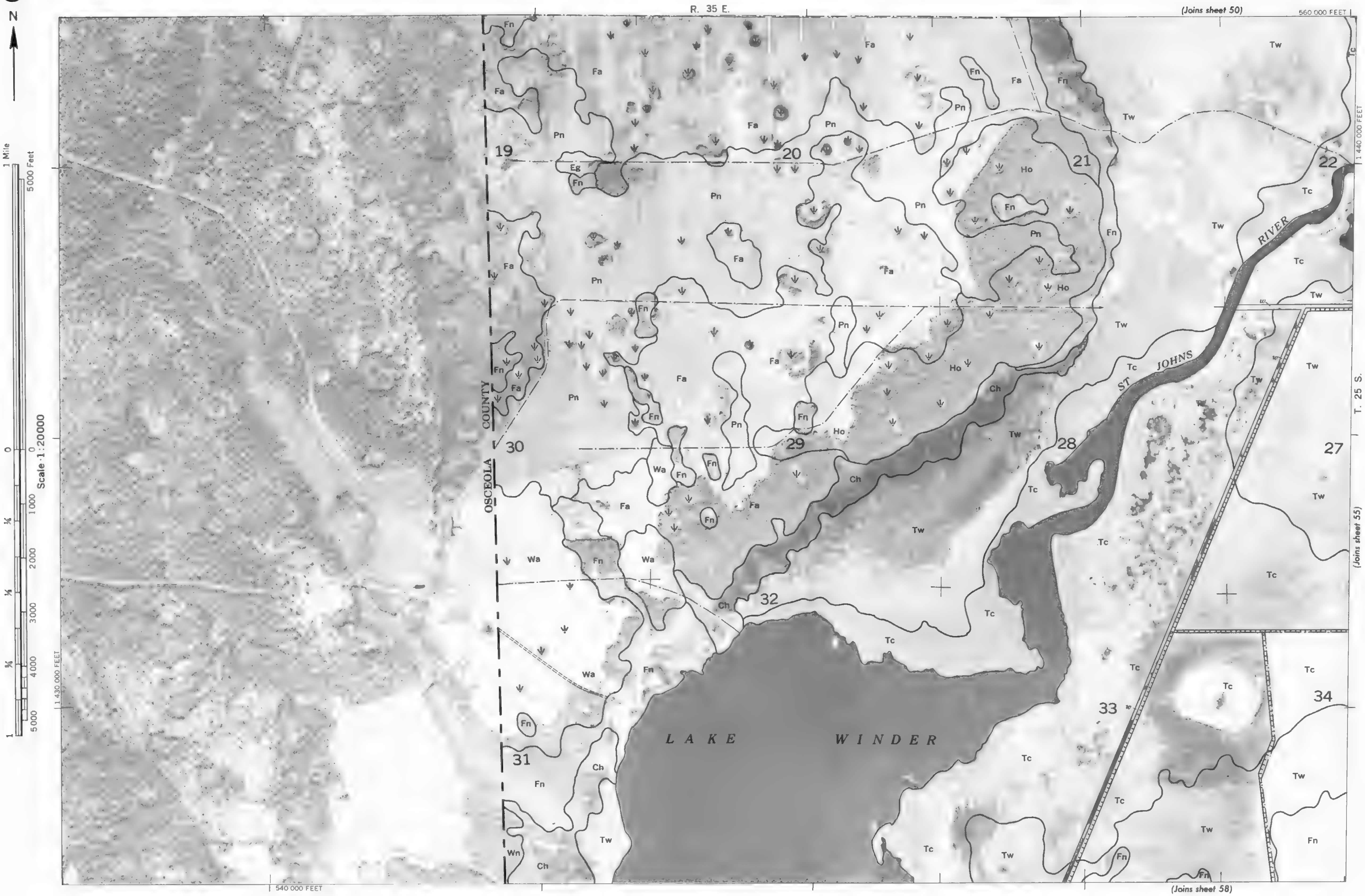

(Joins sheet 43)
(Joins sheet 44)
610 000 FEET
R. 37 E.
1 470 000 FEET
T. 24 S.
(Joins sheet 48)
(Joins sheet 53)
630 000 FEET
1 460 000 FEET
N
BANANA RIVER
ATLANTIC OCEAN
CRANE CREEK
Hall Island
COCOA BEACH
Hospital
Canaveral Pier
19
22
23
26
27
30
31
34
35
Scale 1:20000
1 Mile
5000 Feet


N
R. 35 E.
(Joins sheet 46)
560 000 FEET
1 455 000 FEET
T. 25 S.
(Joins sheet 51)
(Joins sheet 54)
540 000 FEET
1 445 000 FEET
L A K E P O I N S E T T
OSCEOLA COUNTY
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
Qr
Tc
Tw
Fn
Fa
Pn
8
9
10
15
16
17
18

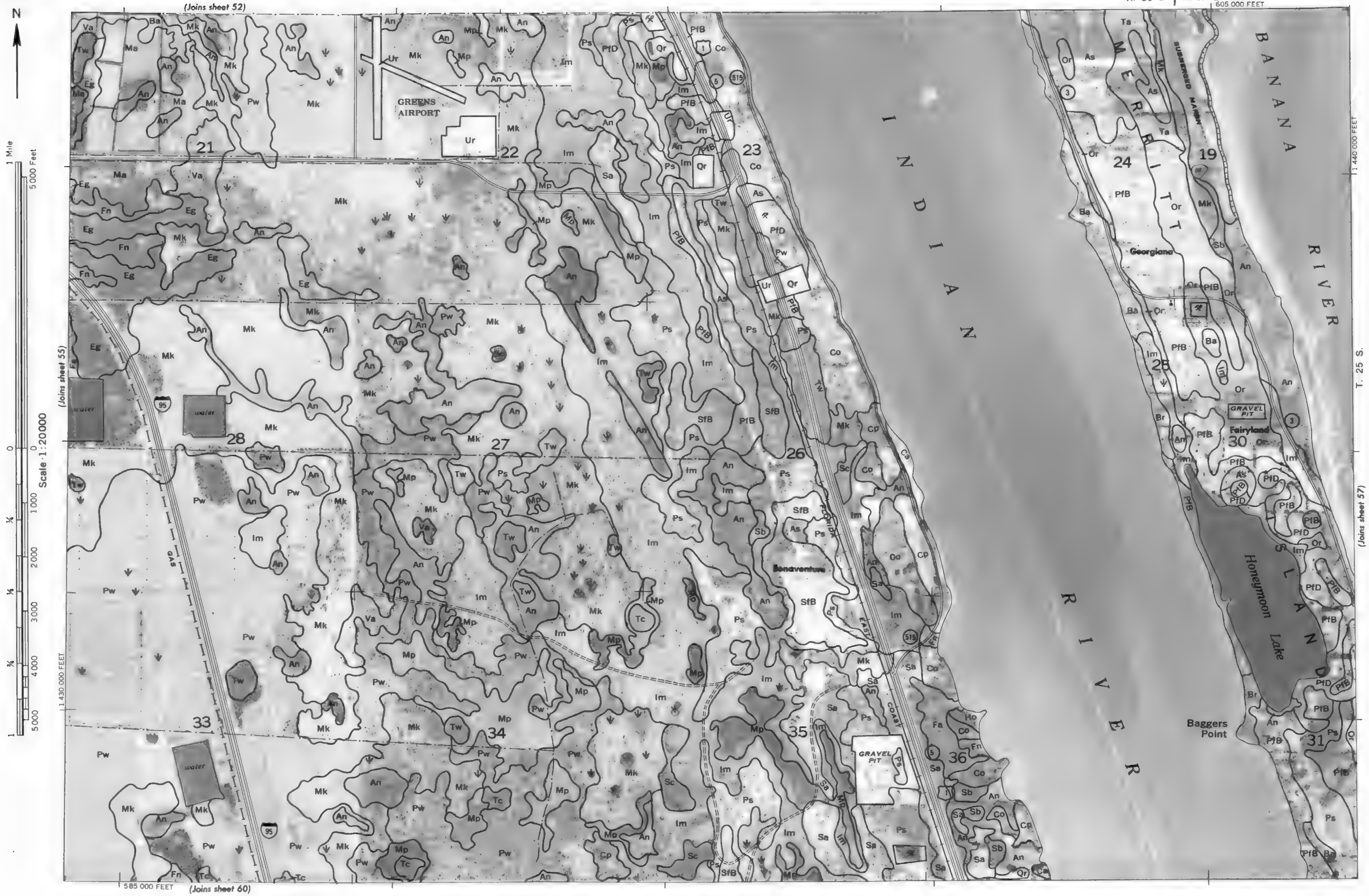

N
(Joins sheet 47)
R. 35 E.
R. 36 E.
565 000 FEET
ROCKLEDGE
ROCKLEDGE GOLF AND COUNTRY CLUB
1 455 000 FEET
T. 25 S.
LAKE POINSETT
ROCKLEDGE CR
Lake Florence
Barnett Lake
GAS
(Joins sheet 50)
(Joins sheet 52)
FAULK CANAL
water
ST. JOHNS RIVER
1 445 000 FEET
580 000 FEET
(Joins sheet 55)
Scale 1:20000
1 Mile
5000 Feet

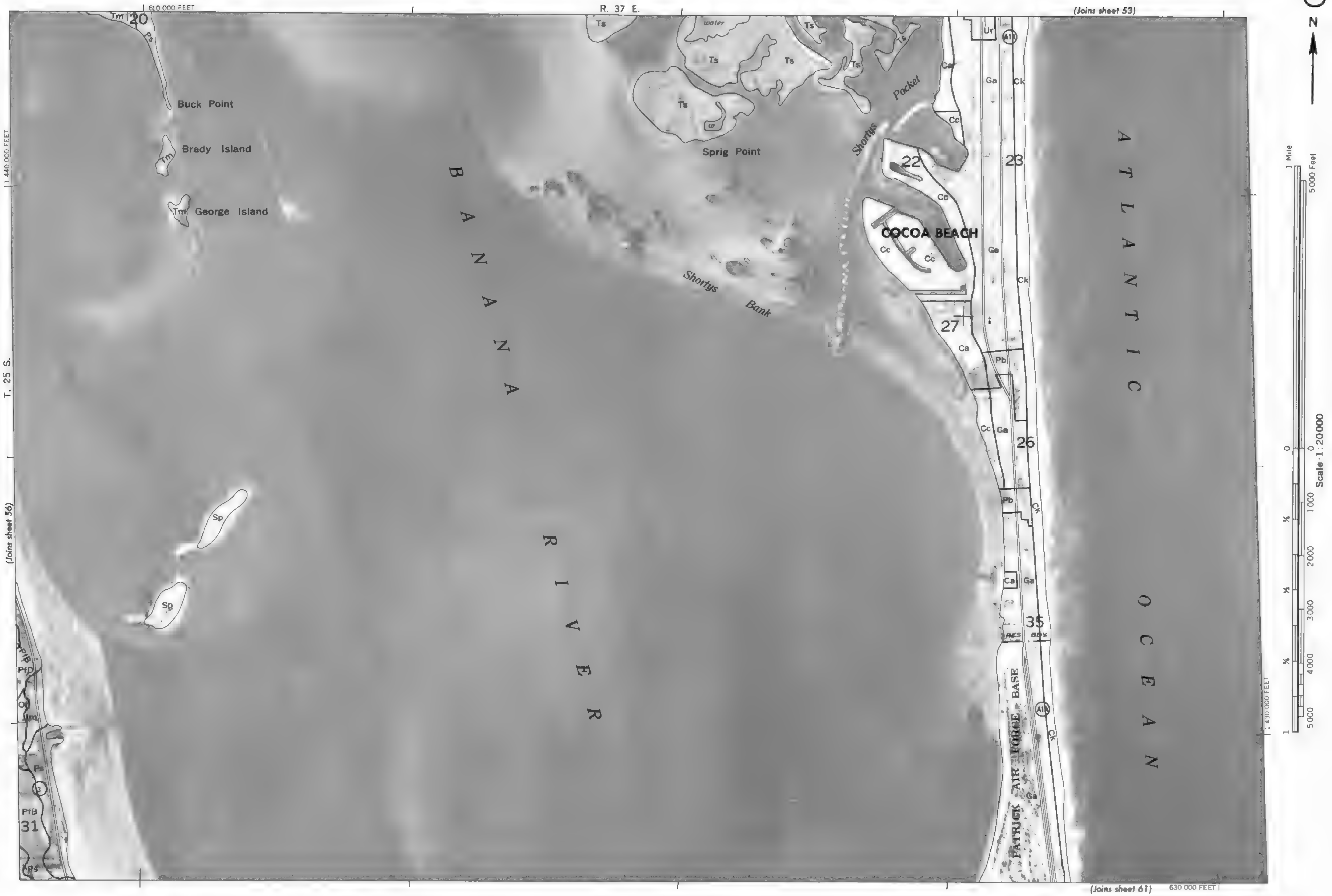

N
R. 36 E.
605 000 FEET
(Joins sheet 48)
ROCKLEDGE
Hospital
FLORIDA
EAST
COAST
INDIAN RIVER
CENTRAL BREVARD AIRPORT
NEWFOUND HARBOR
Pullman Point
Footman
SUBMERGED MARSH
GRAVEL PIT
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 56)
1 455 000 FEET
1 445 000 FEET
585 000 FEET
T. 25 S.
R. 36 E. R. 37 E.
Scale 1:20000
1 Mile
5000 Feet

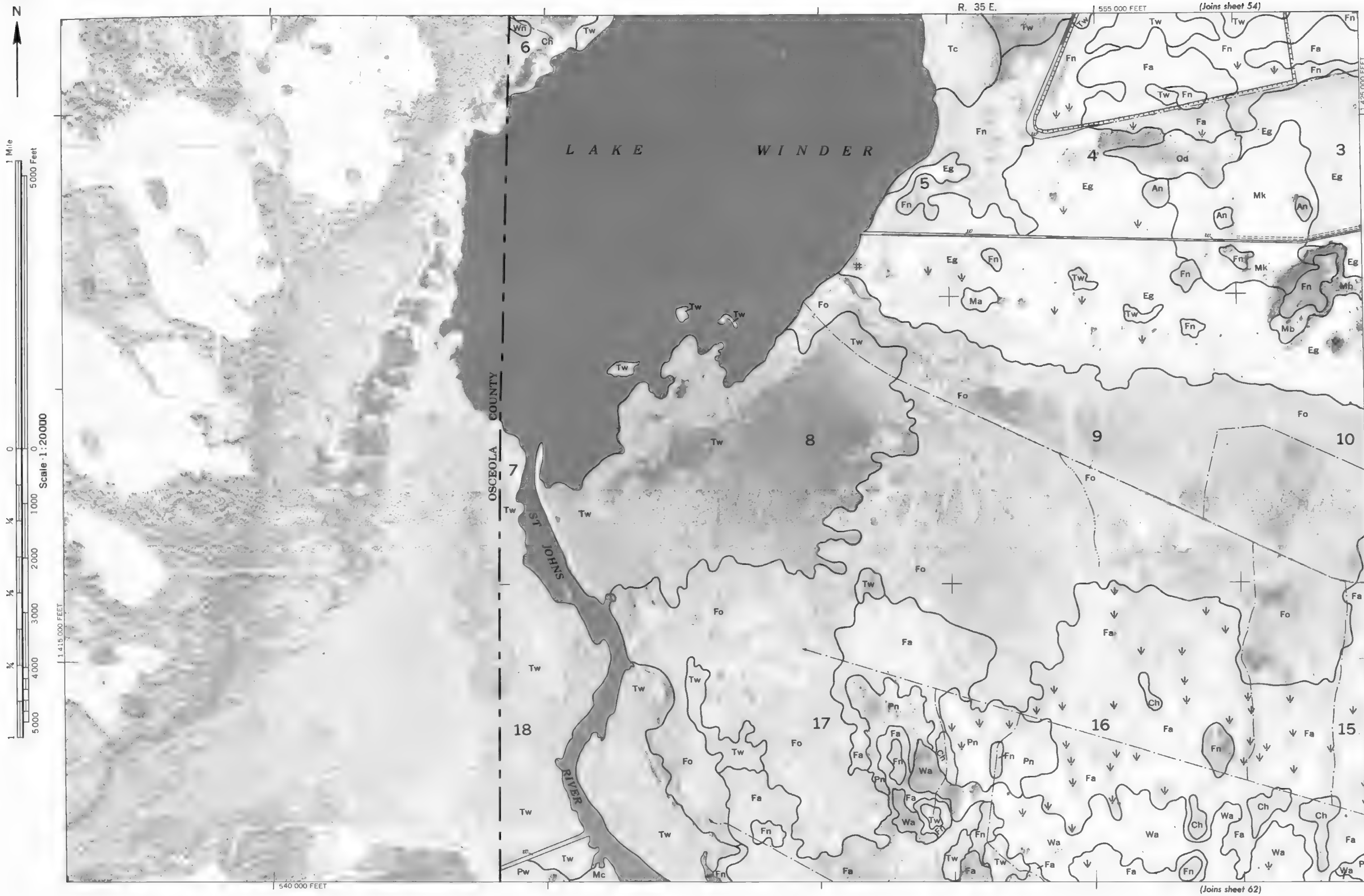

53
N
610 000 FEET
R. 37 E.
(Joins sheet 49)
1 455 000 FEET
T. 25 S.
(Joins sheet 52)
(Joins sheet 57)
630 000 FEET
1 445 000 FEET
Angel City
Shell Point
Big Island
BANANA RIVER
THOUSAND ISLANDS
Catfish Creek
Houseboat Cut
Flowing Well Creek
water
COCOA BEACH
Jones Creek
Shortys Pocket
NEWFOUND HARBOR
NORTH POINT
ATLANTIC OCEAN
A1A
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
1000
2000
3000
4000
5000


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
R. 35 E.
(Joins sheet 50)
560 000 FEET
1 440 000 FEET
T. 25 S.
(Joins sheet 55)
(Joins sheet 58)
540 000 FEET
1 430 000 FEET
OSCEOLA COUNTY
ST JOHNS RIVER
LAKE WINDER
19
20
21
22
27
28
29
30
31
32
33
34
Fn
Fa
Pn
Eg
Ho
Tw
Tc
Ch
Wa
Wn

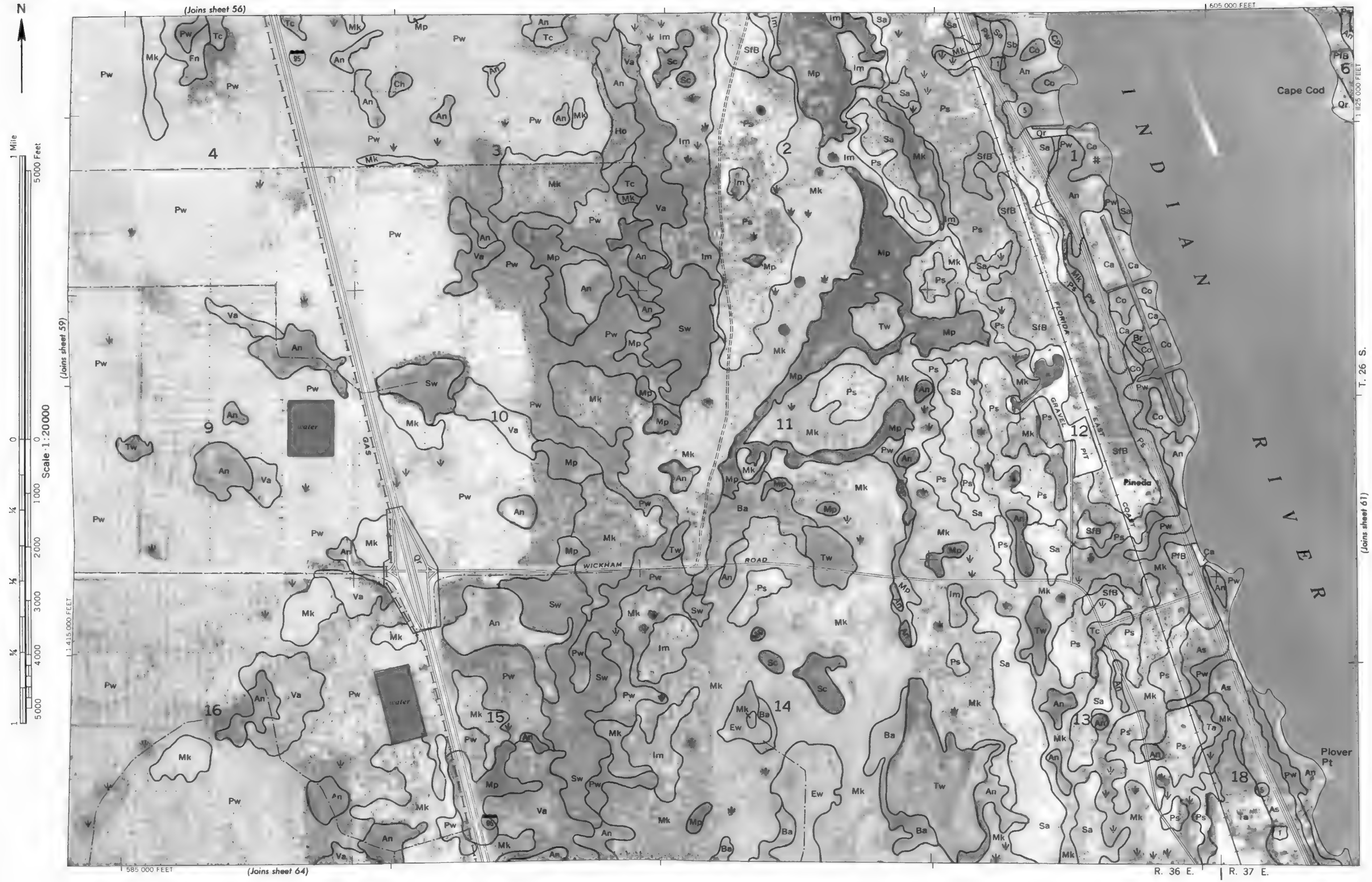

55
N
(Joins sheet 51)
565 000 FEET
R. 35 E.
R. 36 E.
1 440 000 FEET
ST JOHNS RIVER
GAS
95
T. 25 S.
(Joins sheet 54)
(Joins sheet 56)
(Joins sheet 59)
580 000 FEET
1 430 000 FEET
water
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Tc
Tw
Ho
Fa
Fn
Ch
Pn
Pw
Eg
Wn
Wa
Mk
Od
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 52)
R. 36 E. | R. 37 E.
605 000 FEET
1 440 000 FEET
T. 25 S.
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 60)
585 000 FEET
1 430 000 FEET
1 Mile
5000 Feet
Scale 1:20000
GREENS AIRPORT
INDIAN RIVER
BANANA RIVER
MERRITT ISLAND
SUBMERGED MARSH
Georgiana
Fairyland
GRAVEL PIT
Honeymoon Lake
Baggers Point
Bonaventure
FLORIDA EAST COAST
GAS
water
21
22
23
24
19
25
26
27
28
30
31
33
34
35
36

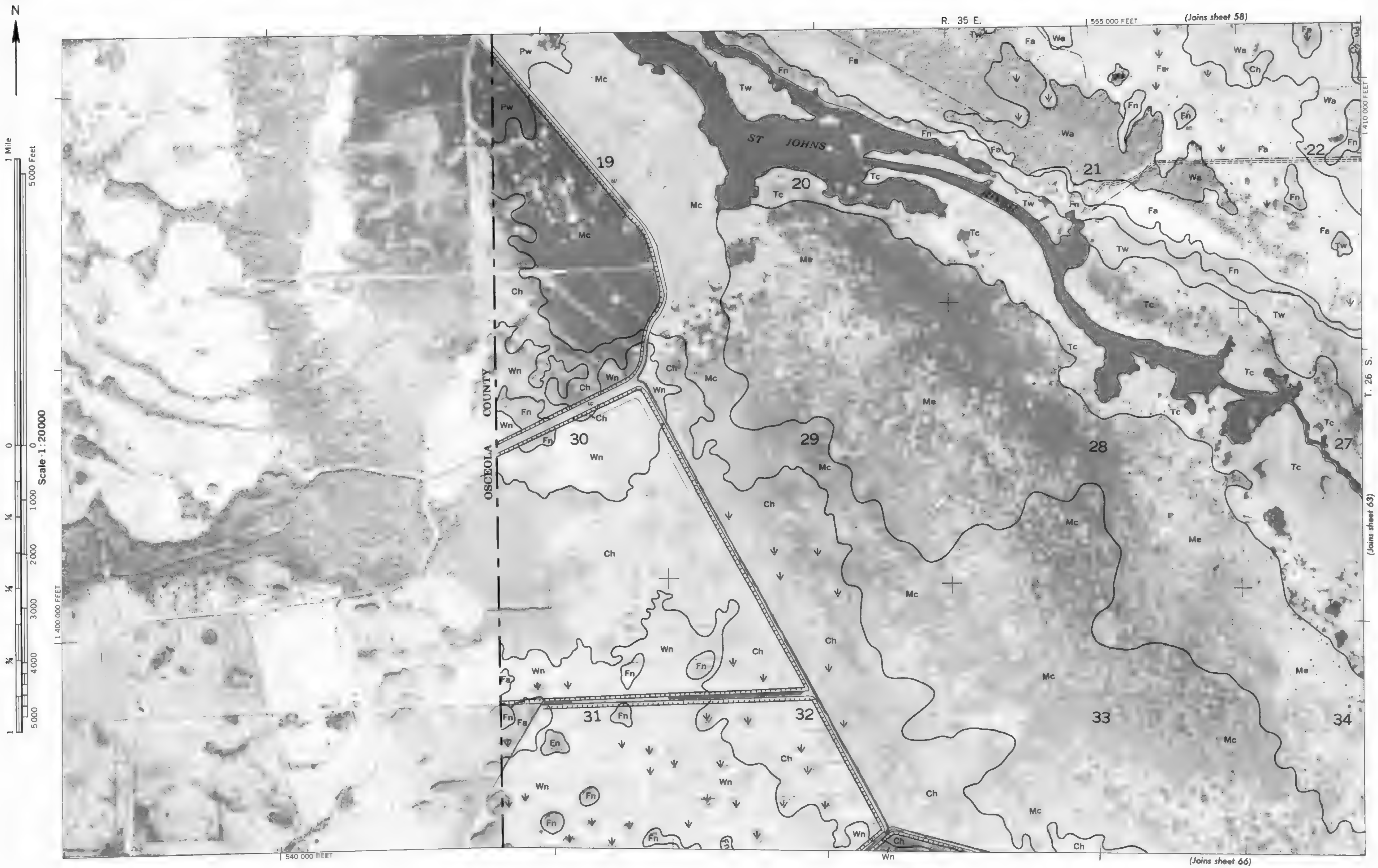

57
N
610 000 FEET
R. 37 E.
(Joins sheet 53)
1 440 000 FEET
T. 25 S.
(Joins sheet 56)
Buck Point
Brady Island
George Island
BANANA RIVER
Sprig Point
Shortys Pocket
Shortys Bank
COCOA BEACH
ATLANTIC OCEAN
PATRICK AIR FORCE BASE
RES BDY
1 430 000 FEET
(Joins sheet 61)
630 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
20
22
23
27
26
35
31
Tm
Ps
Ts
water
Ur
Ca
Ga
Ck
Cc
Pb
Sp
PfD
PfB
Ps
A1A
3

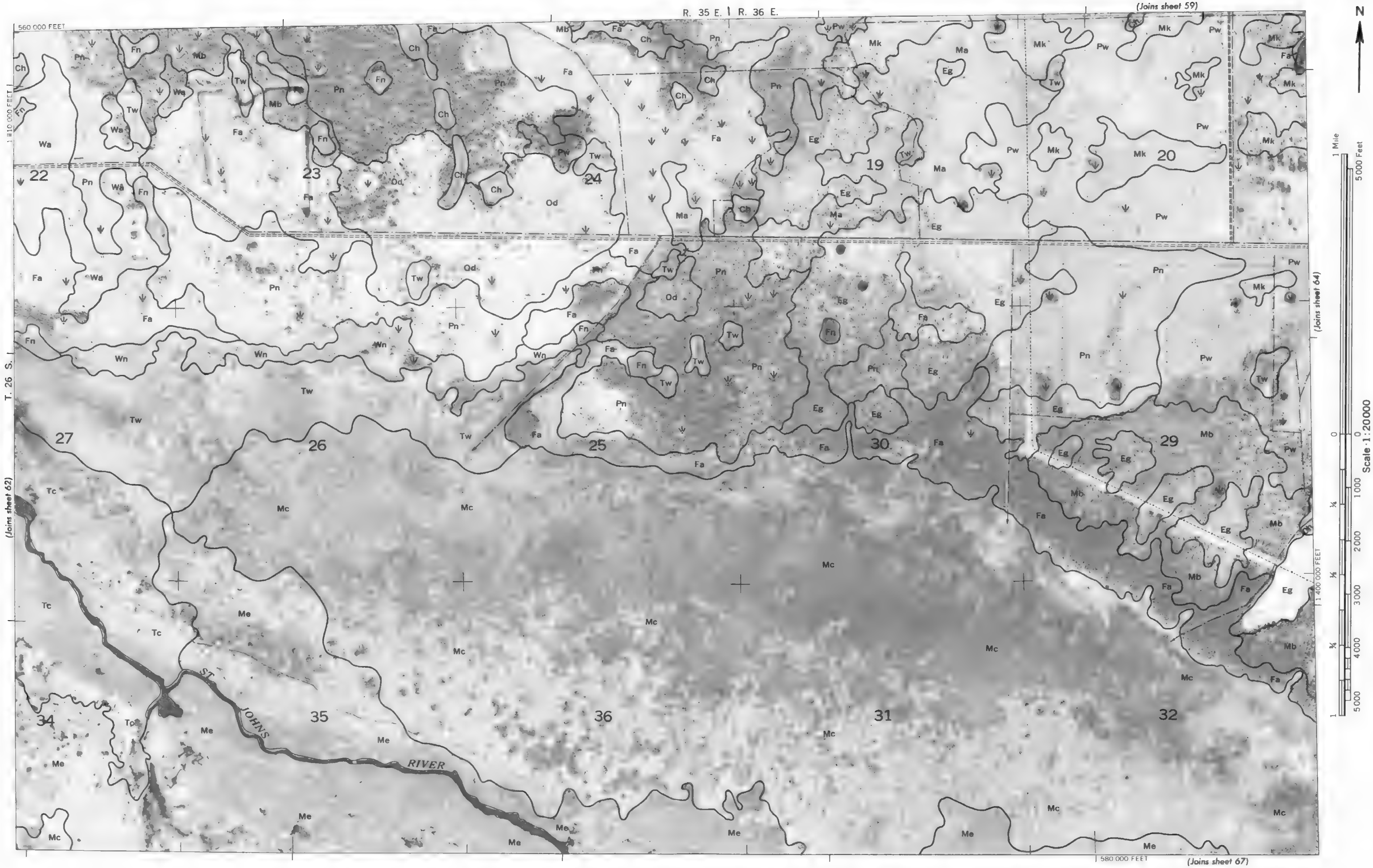

N
1 Mile
5000 Feet
Scale 1:20000
R. 35 E.
555 000 FEET
(Joins sheet 54)
1 425 000 FEET
LAKE WINDER
OSCEOLA COUNTY
ST JOHNS RIVER
T. 26 S.
(Joins sheet 59)
1 415 000 FEET
540 000 FEET
(Joins sheet 62)


N
560 000 FEET
580 000 FEET
1 425 000 FEET
1 415 000 FEET
R. 35 E. | R. 36 E.
T. 26 S.
(Joins sheet 55)
(Joins sheet 60)
(Joins sheet 58)
(Joins sheet 63)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
Fa
Fn
Fo
Od
Mk
Eg
Im
Tw
Pn
Ma
An
Wa
Pw
Mb
Mp
Ch

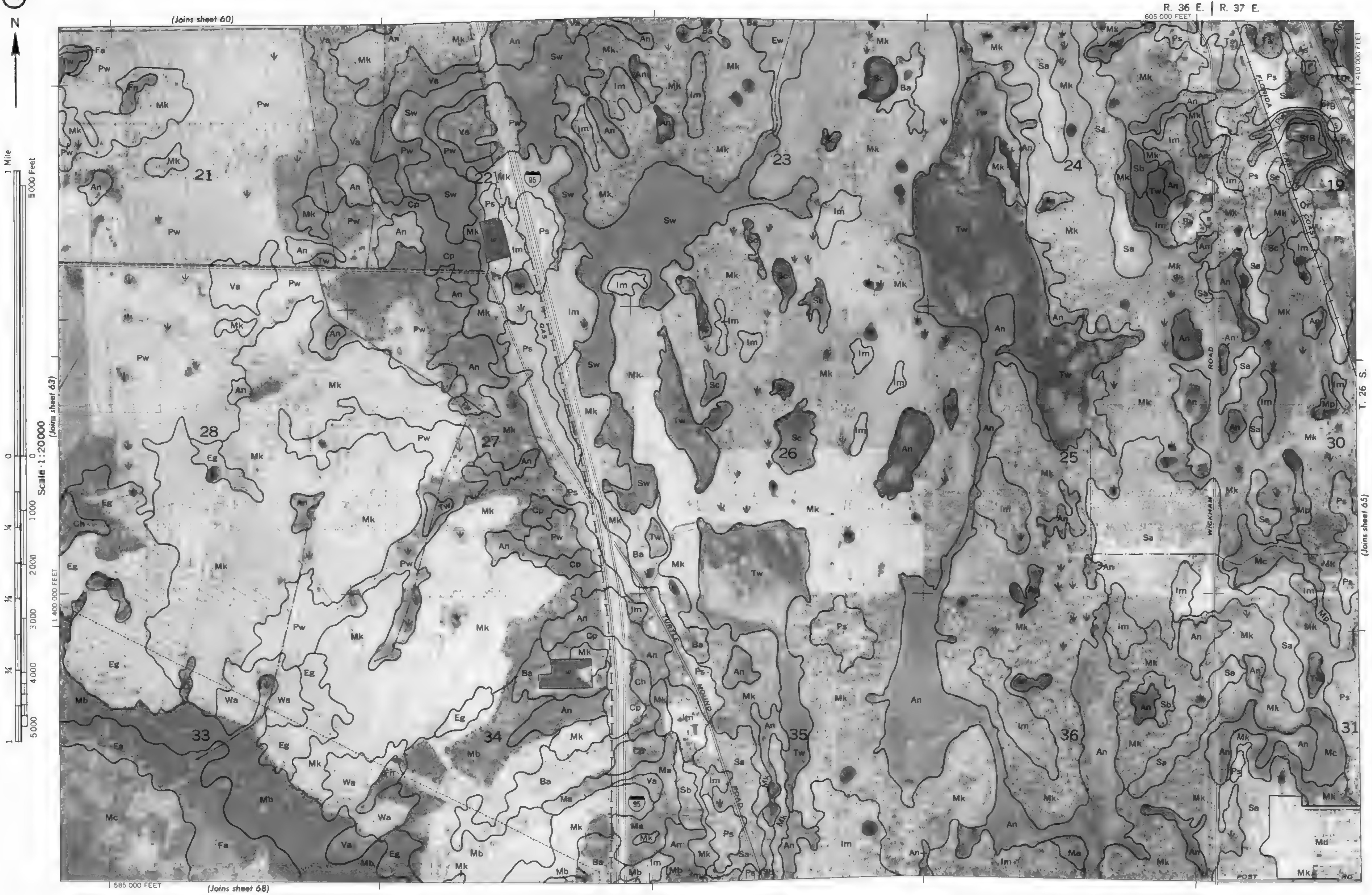

N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 56)
(Joins sheet 59)
(Joins sheet 61)
(Joins sheet 64)
605 000 FEET
585 000 FEET
1 415 000 FEET
1 425 000 FEET
T. 26 S.
R. 36 E.
R. 37 E.
INDIAN RIVER
Cape Cod
Plover Pt
Pineda
WICKHAM ROAD
FLORIDA EAST COAST
GRAVEL PIT
GAS
water
95
1


610 000 FEET
R. 37 E.
(Joins sheet 57)
N
1 425 000 FEET
T. 26 S.
(Joins sheet 60)
INDIAN RIVER
BANANA RIVER
ATLANTIC OCEAN
PATRICK AIR FORCE BASE
Lotus
Mangrove Point
1 415 000 FEET
630 000 FEET
(Joins sheet 65)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
R. 35 E.
555 000 FEET
(Joins sheet 58)
1 410 000 FEET
T. 26 S.
(Joins sheet 63)
(Joins sheet 66)
540 000 FEET
1 400 000 FEET
OSCEOLA COUNTY
ST JOHNS RIVER
19
20
21
22
27
28
29
30
31
32
33
34
Pw
Mc
Me
Ch
Wn
Fn
Fa
Tw
Tc
Wa

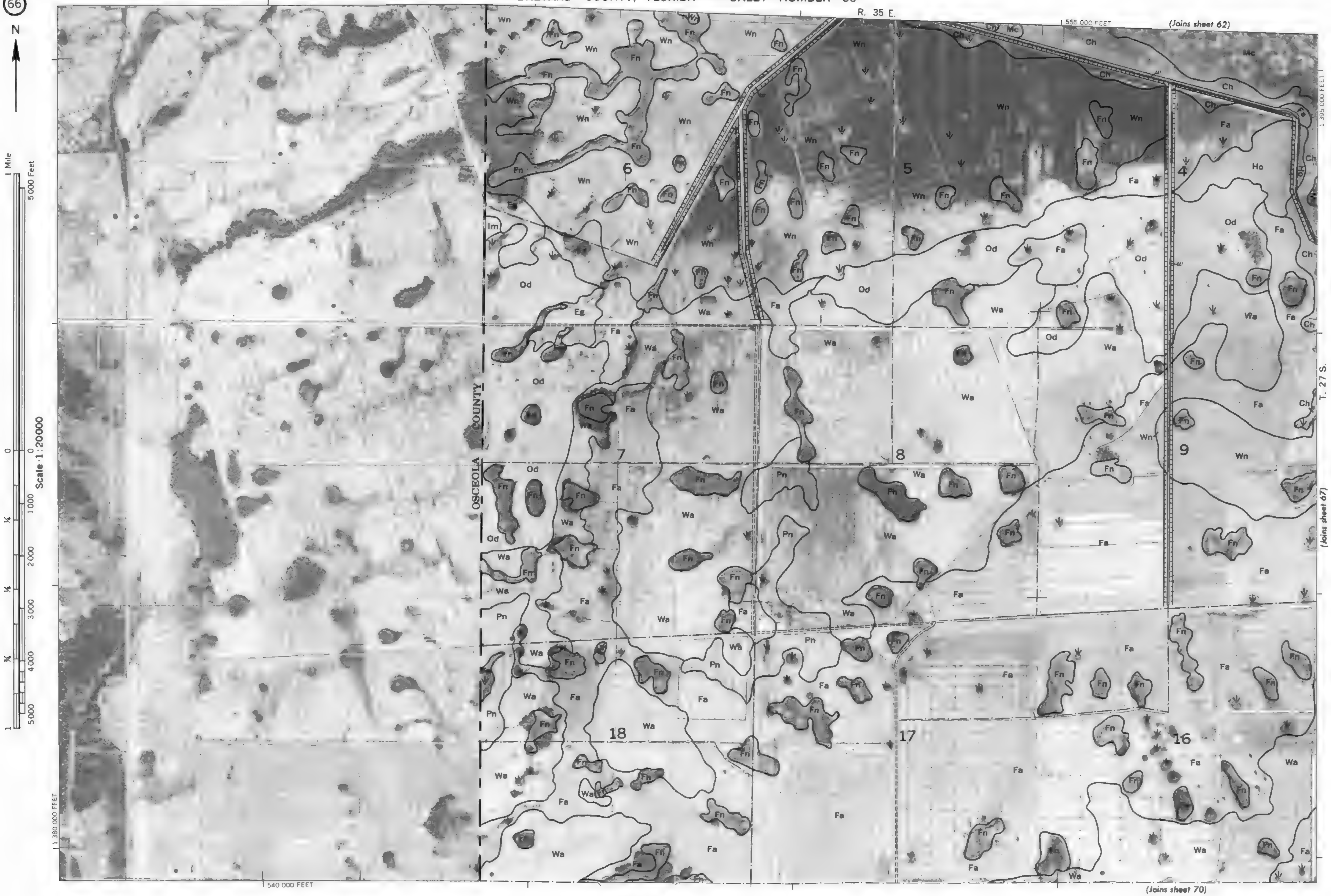


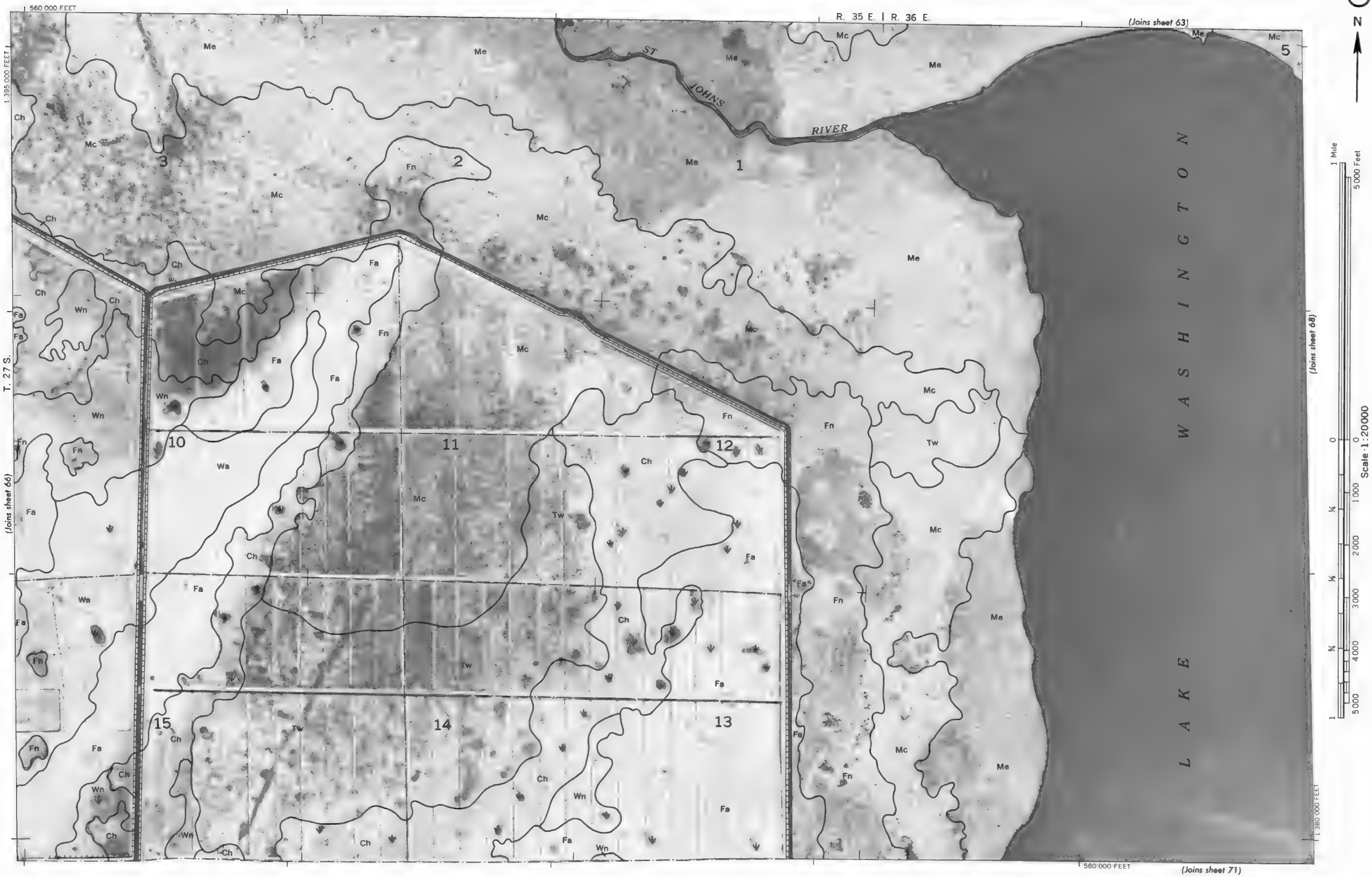
63
N
R. 35 E.
R. 36 E.
(Joins sheet 59)
560 000 FEET
1 410 000 FEET
T. 26 S.
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 67)
580 000 FEET
1 400 000 FEET
ST. JOHNS RIVER
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Scale 1:20000
1 Mile
5000 Feet


N
(Joins sheet 60)
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 68)
R. 36 E. | R. 37 E.
T. 26 S.
605 000 FEET
1 410 000 FEET
1 400 000 FEET
585 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
95
GAS
TURTLE MOUND ROAD
WICKHAM ROAD
POST RD
FLORIDA EAST COAST

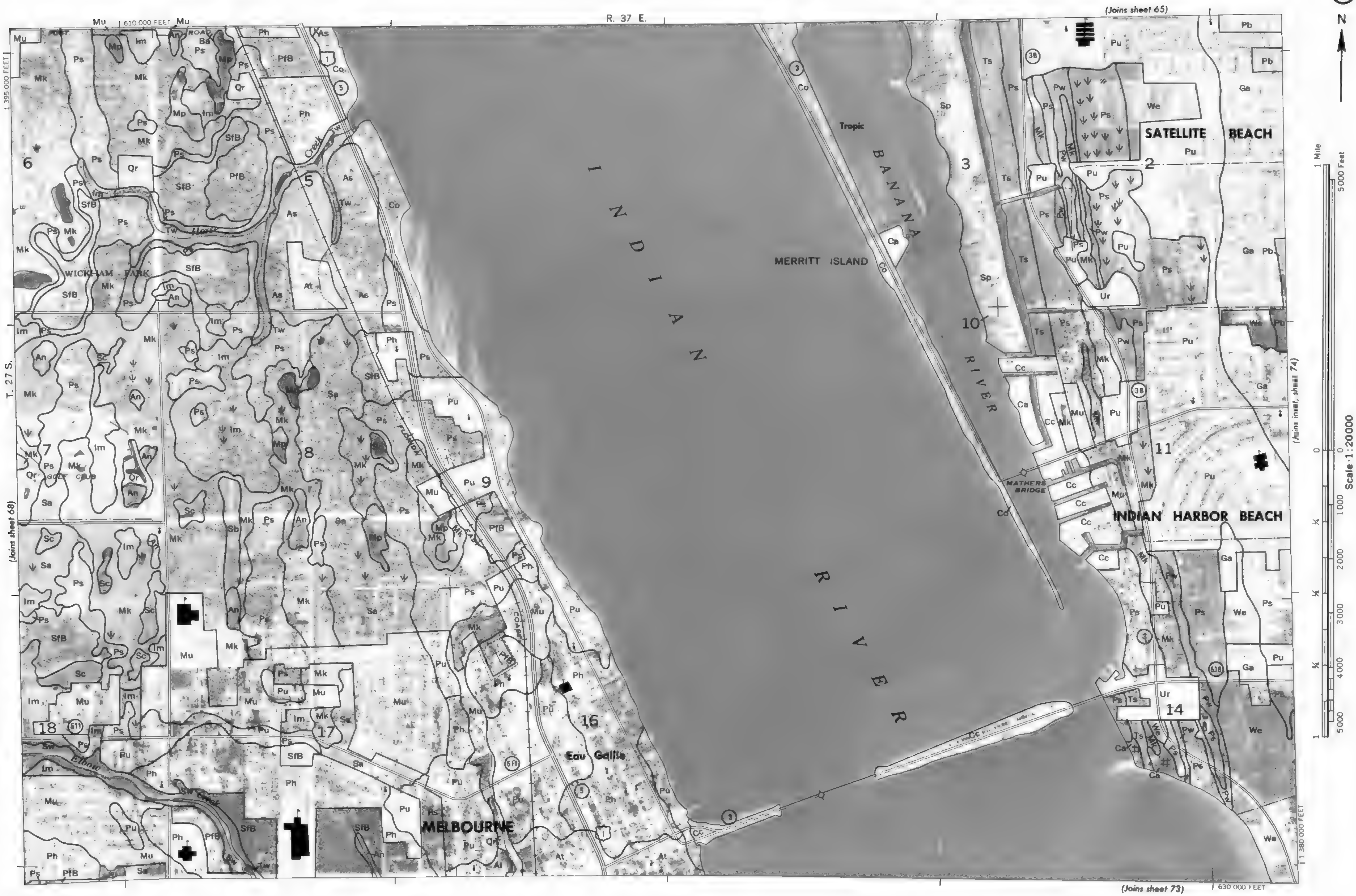

N
610 000 FEET
R. 37 E.
(Joins sheet 61)
1 410 000 FEET
T. 26 S.
(Joins sheet 64)
INDIAN RIVER
MERRITT ISLAND
BANANA RIVER
ATLANTIC OCEAN
PATRICK A F B
SOUTH PATRICK
SATELLITE BEACH
Palm Shores
FLORIDA EAST COAST
POST ROAD
1 400 000 FEET
630 000 FEET
(Joins sheet 69)
(Joins inset, sheet 74)
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

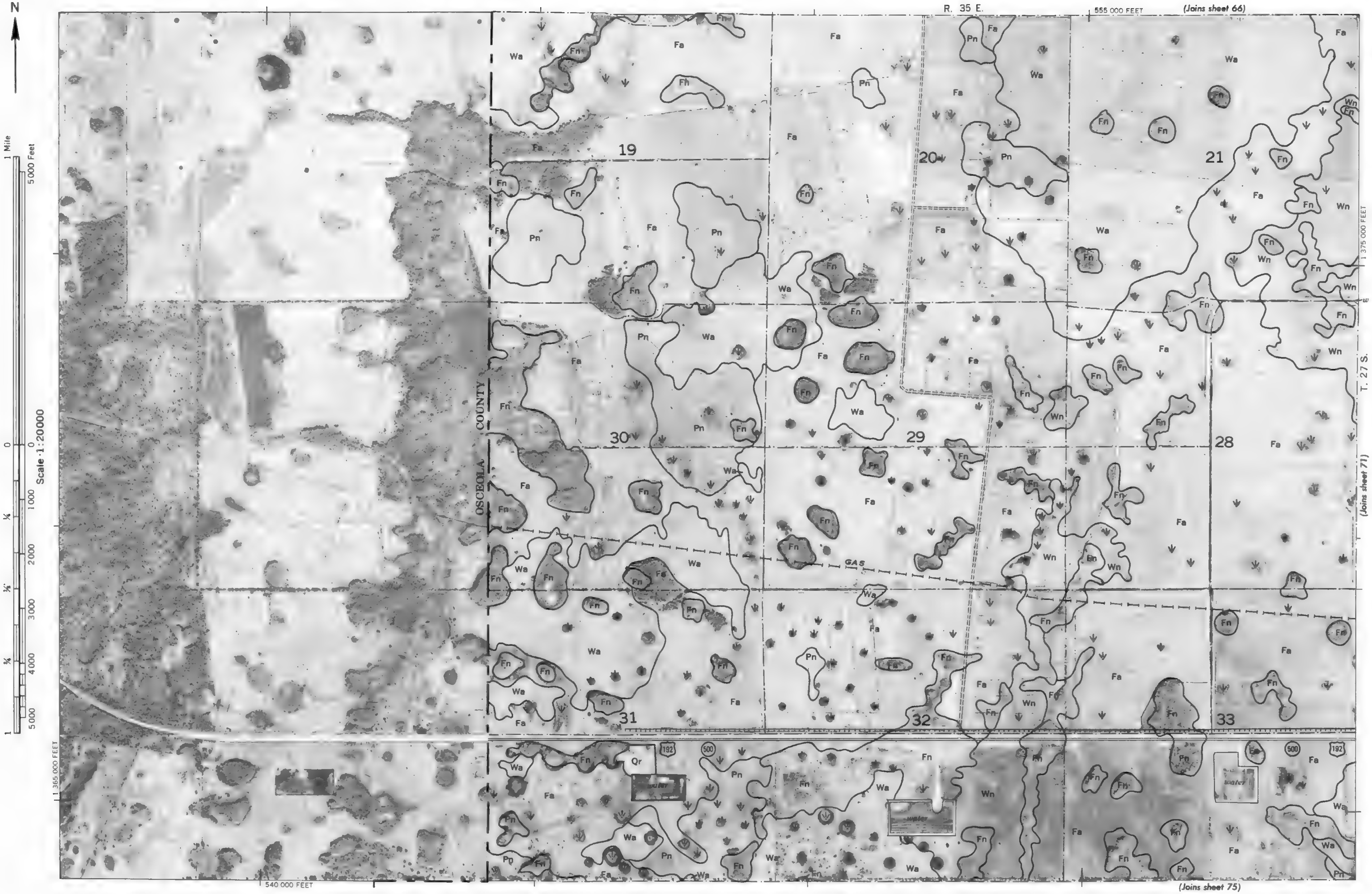
BREVARD COUNTY, FLORIDA — SHEET NUMBER 66

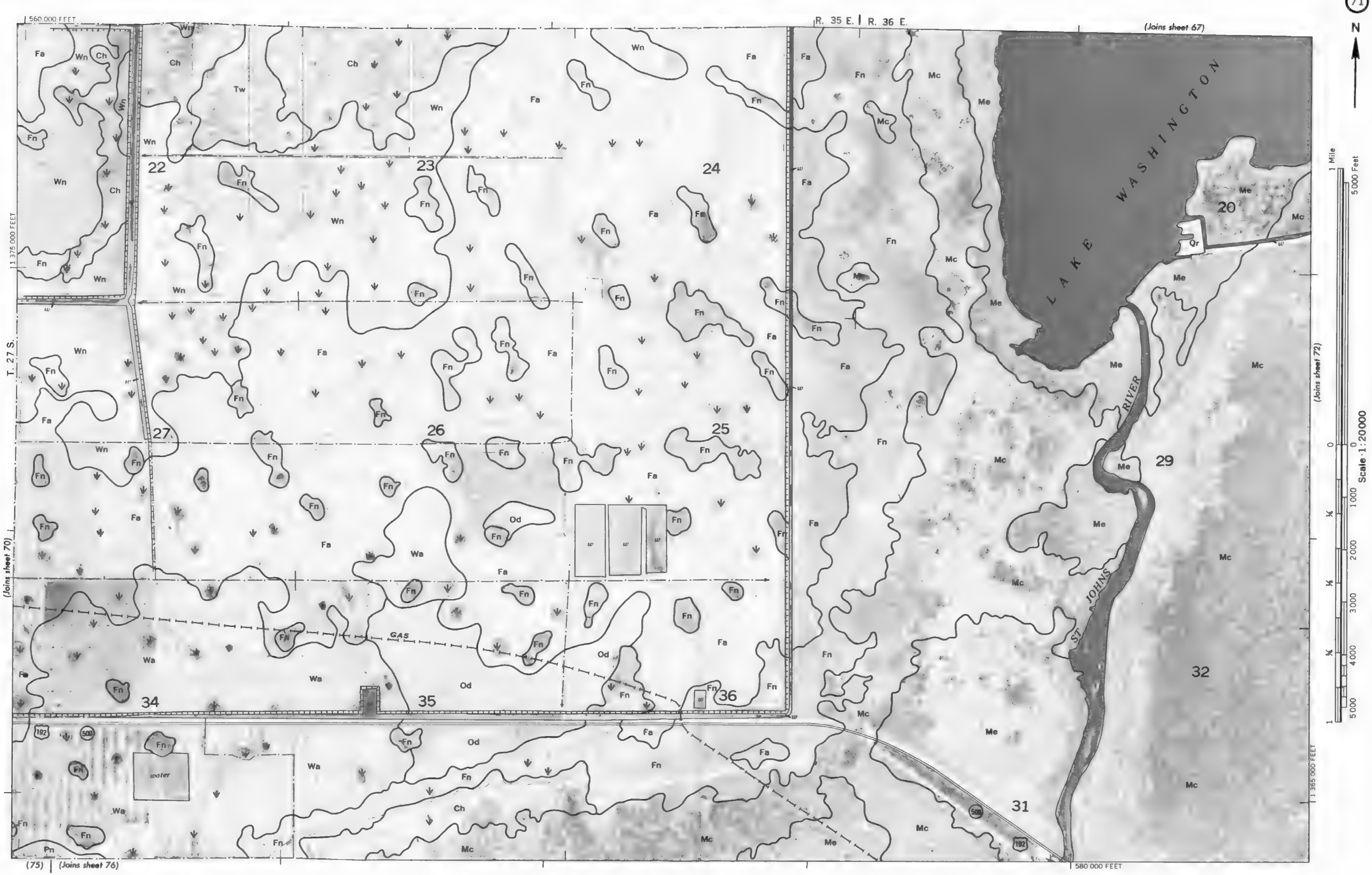



67
N
560 000 FEET
1 395 000 FEET
R. 35 E. | R. 36 E.
(Joins sheet 63)
(Joins sheet 68)
(Joins sheet 66)
(Joins sheet 71)
T. 27 S.
580 000 FEET
1 380 000 FEET
ST JOHNS RIVER
LAKE WASHINGTON
1 Mile
5000 Feet
Scale 1:20000
Me
Mc
Ch
Fn
Fa
Wn
Wa
Tw
1
2
3
5
10
11
12
13
14
15


N
(Joins sheet 64)
R. 36 E.
R. 37 E.
605 000 FEET
1 395 000 FEET
T. 27 S.
(Joins sheet 69)
(Joins sheet 67)
(Joins sheet 72)
585 000 FEET
1 380 000 FEET
LAKE WASHINGTON
LAKE WASHINGTON ROAD
WICKHAM PARK
WICKHAM ROAD
GOLF CLUB
TURTLE MOUND ROAD
GAS
Elbow Creek
Aurora
water
1 Mile
5000 Feet
Scale 1:20000

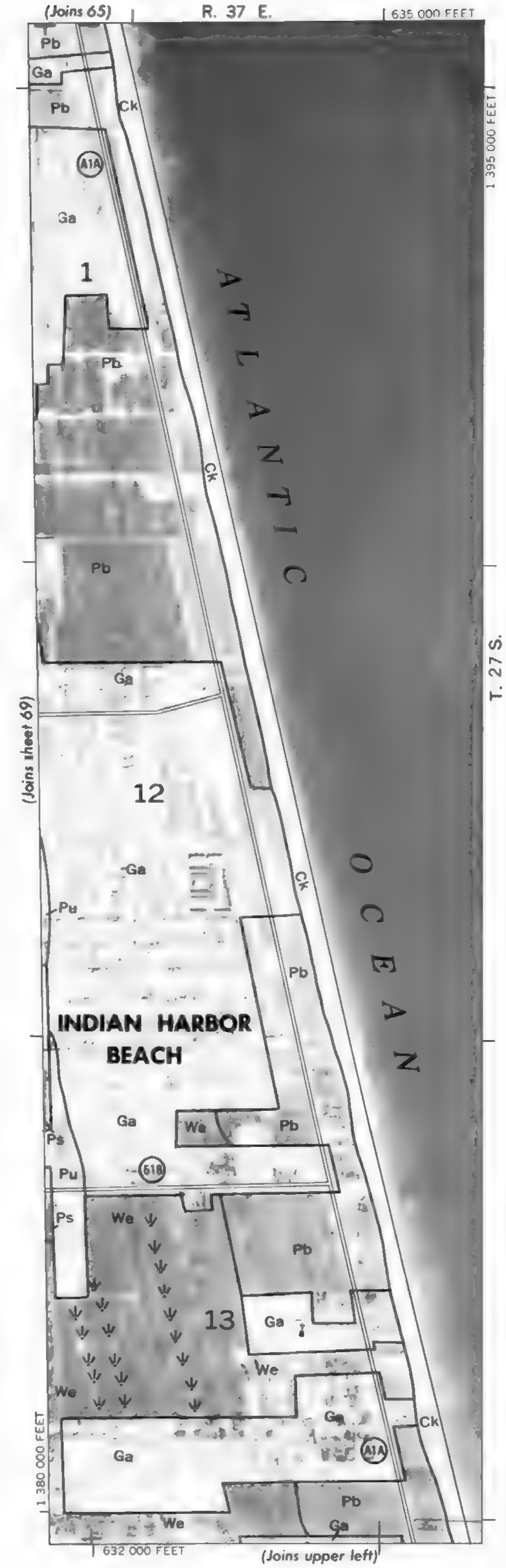

(Joins sheet 65)
R. 37 E.
610 000 FEET
1 395 000 FEET
T. 27 S.
(Joins sheet 68)
(Joins inset, sheet 74)
(Joins sheet 73)
630 000 FEET
1 380 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
INDIAN RIVER
BANANA RIVER
MERRITT ISLAND
Tropic
SATELLITE BEACH
INDIAN HARBOR BEACH
MATHERS BRIDGE
WICKHAM PARK
GOLF CLUB
Eau Gallie
MELBOURNE
Horse Creek
Elbow Creek


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
R. 35 E.
555 000 FEET
(Joins sheet 66)
1 375 000 FEET
T. 27 S.
(Joins sheet 71)
1 365 000 FEET
540 000 FEET
(Joins sheet 75)
OSCEOLA COUNTY
19
20
21
28
29
30
31
32
33
GAS
192
500
Fa
Fn
Pn
Wa
Wn
Qr
water

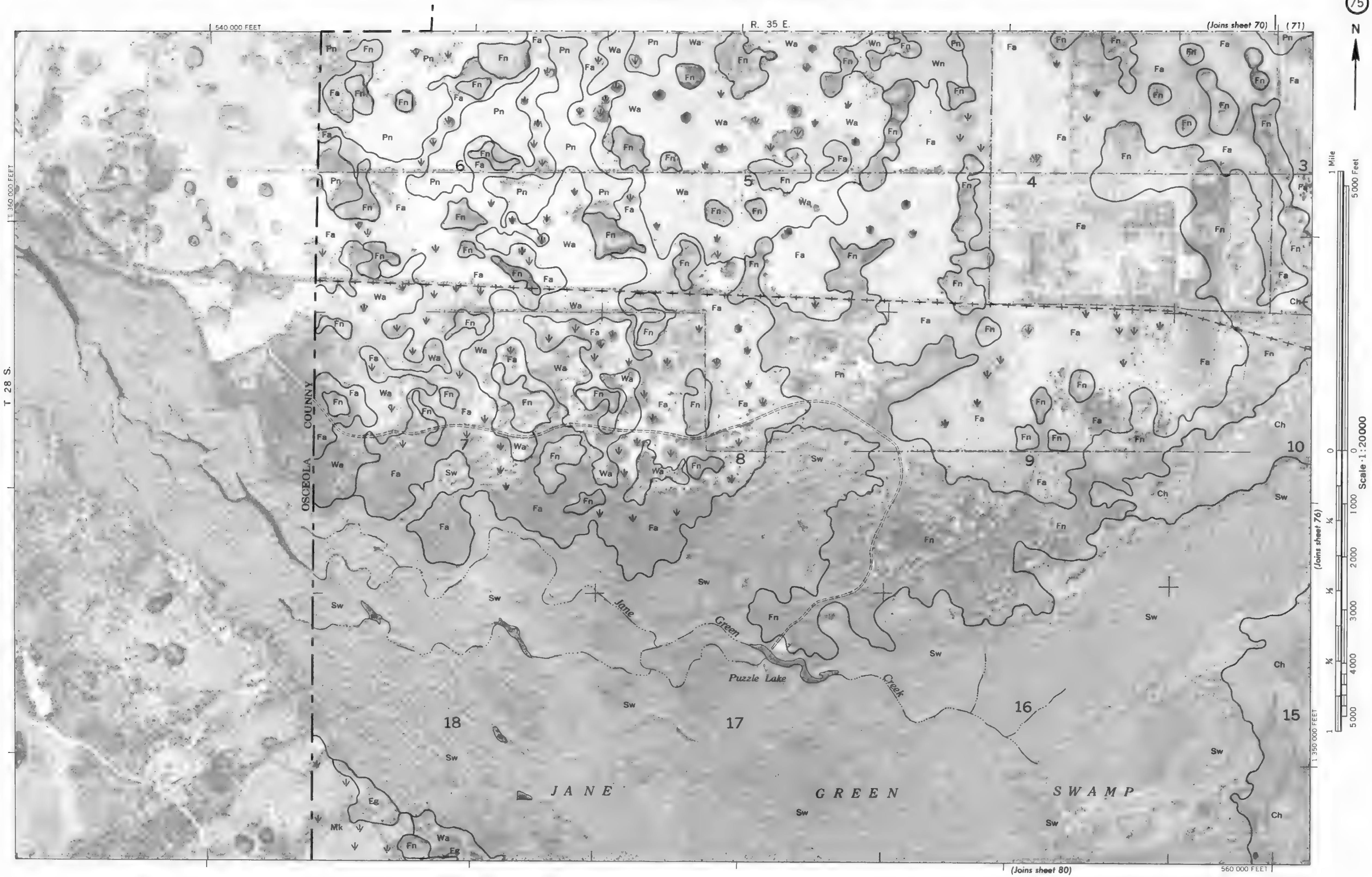

71
N
560 000 FEET
R. 35 E.
R. 36 E.
(Joins sheet 67)
LAKE WASHINGTON
ST JOHNS RIVER
T. 27 S.
1 375 000 FEET
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 76)
(75)
580 000 FEET
1 365 000 FEET
GAS
water
192
500
22
23
24
25
26
27
20
29
32
31
34
35
36
Fa
Fn
Wn
Ch
Tw
Mc
Me
Qr
Od
Wa
Pn
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000


N
(Joins sheet 68)
(Joins sheet 71)
(Joins sheet 73)
(Joins sheet 77)
R. 36 E.
R. 37 E.
T. 27 S.
605 000 FEET
585 000 FEET
1 375 000 FEET
1 365 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
GRAVEL PIT
water
WICKHAM ROAD
GAS
Melbourne Village
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

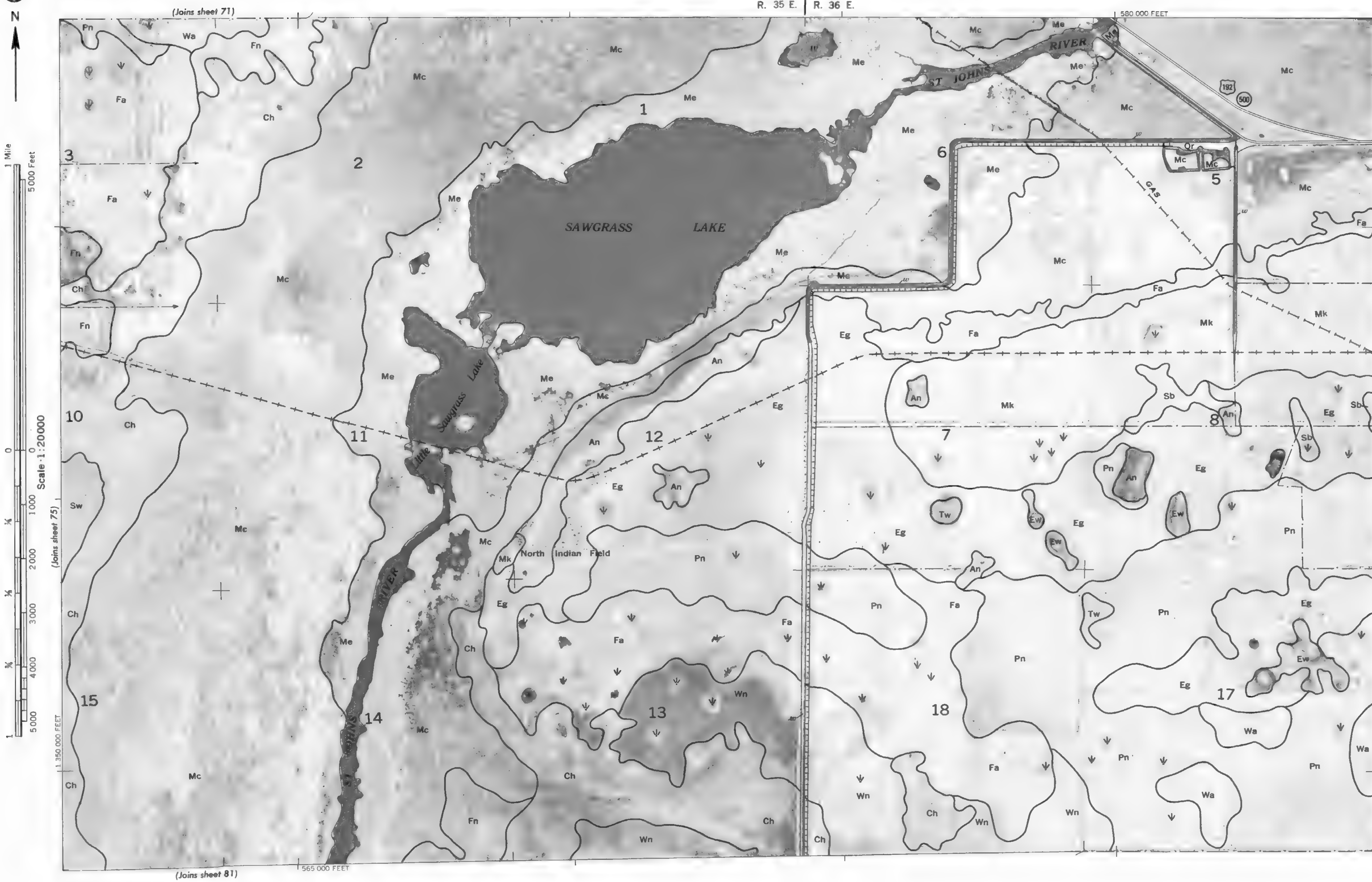

N
610 000 FEET
R. 37 E.
(Joins sheet 69)
(Joins sheet 74)
(Joins sheet 78)
(Joins sheet 72)
630 000 FEET
1 375 000 FEET
1 365 000 FEET
T. 27 S.
ELBOW CREEK
Eau Gallie
INDIAN RIVER
MELBOURNE
CAPE KENNEDY REGIONAL AIRPORT
FLORIDA EAST COAST
Hospital
19
20
21
22
24
27
28
29
30
31
32
33
34
1 Mile
5000 Feet
Scale 1:20000

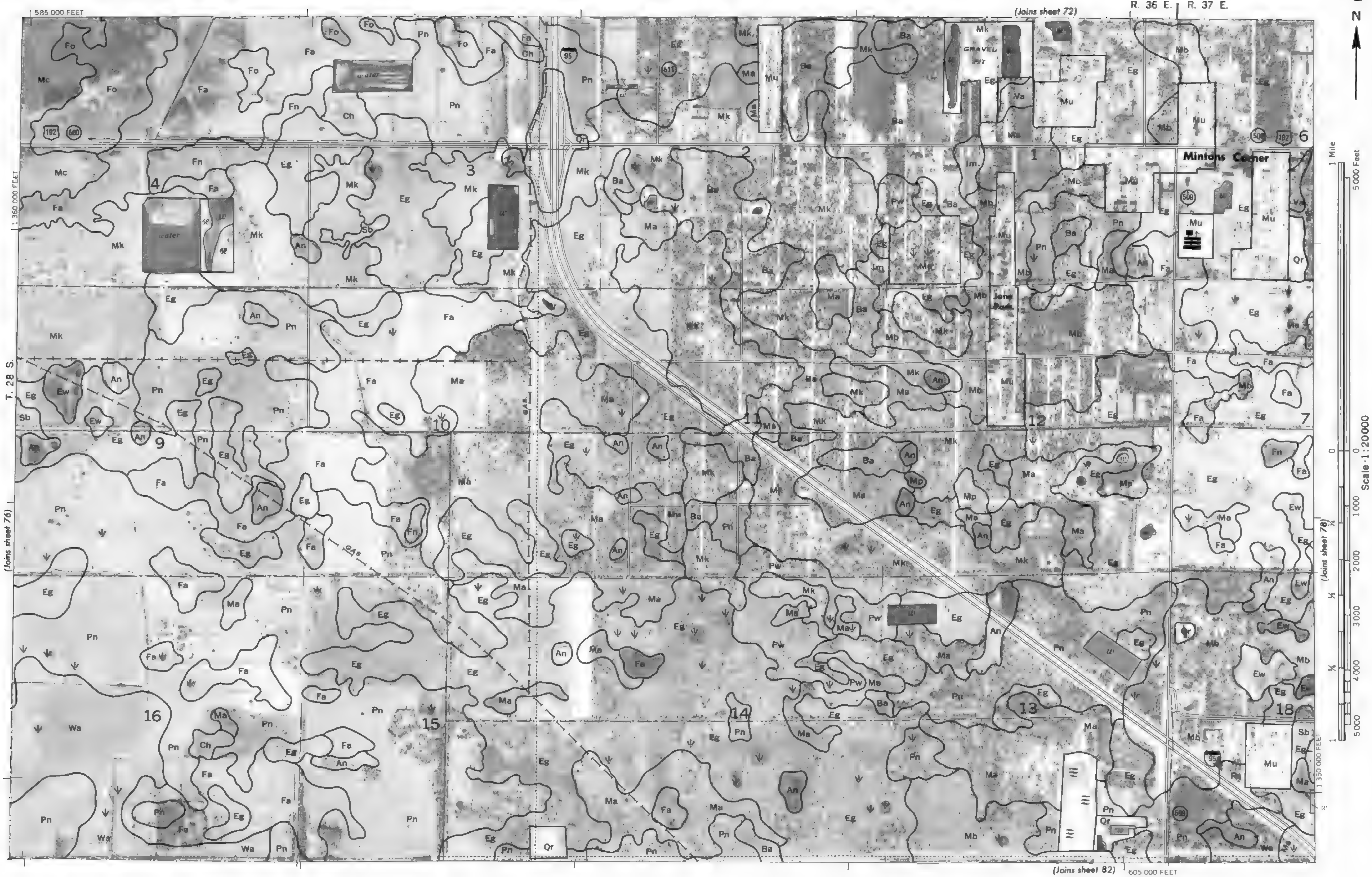


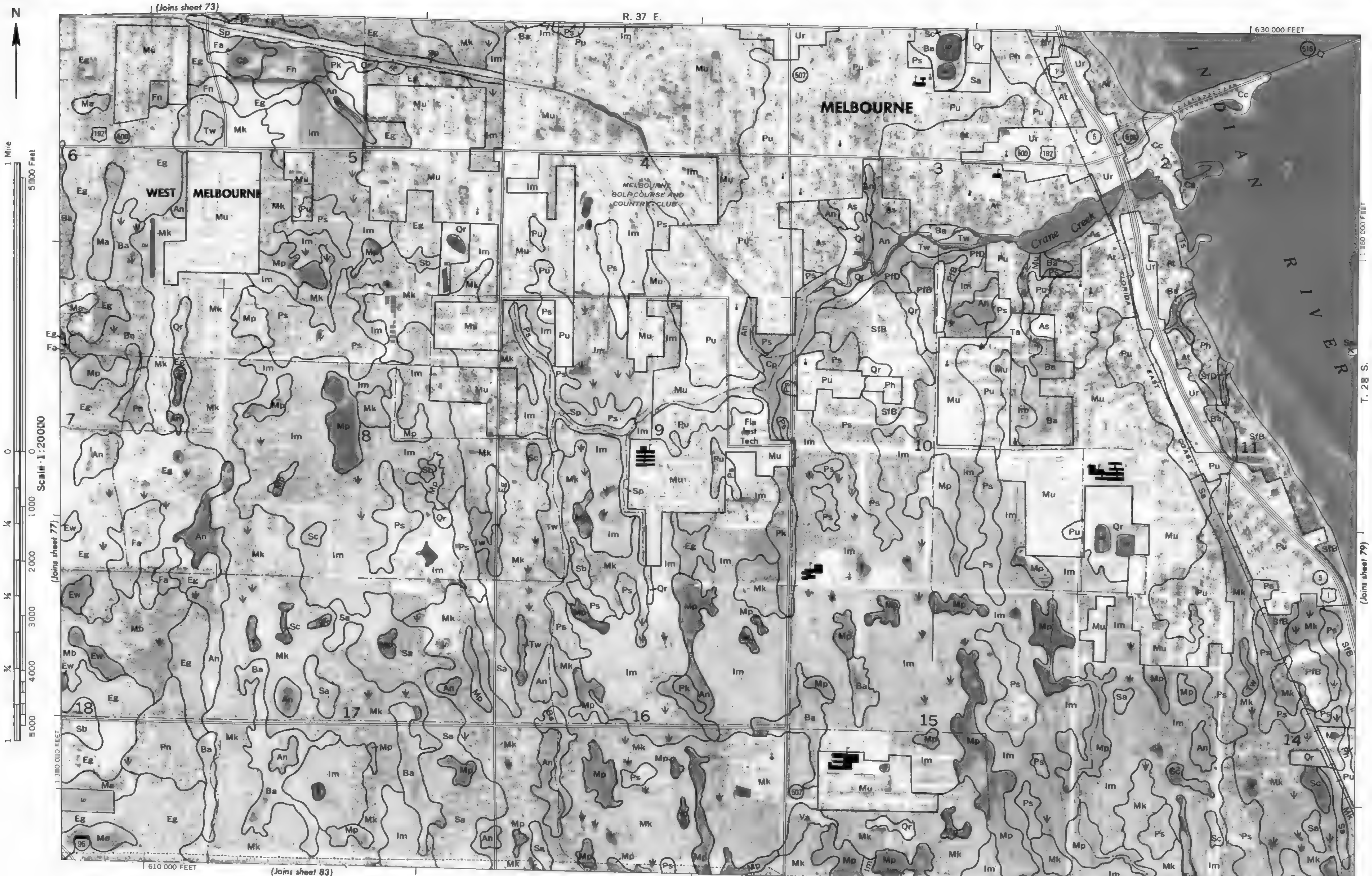
3000 AND 5000-FOOT GRID TICKS

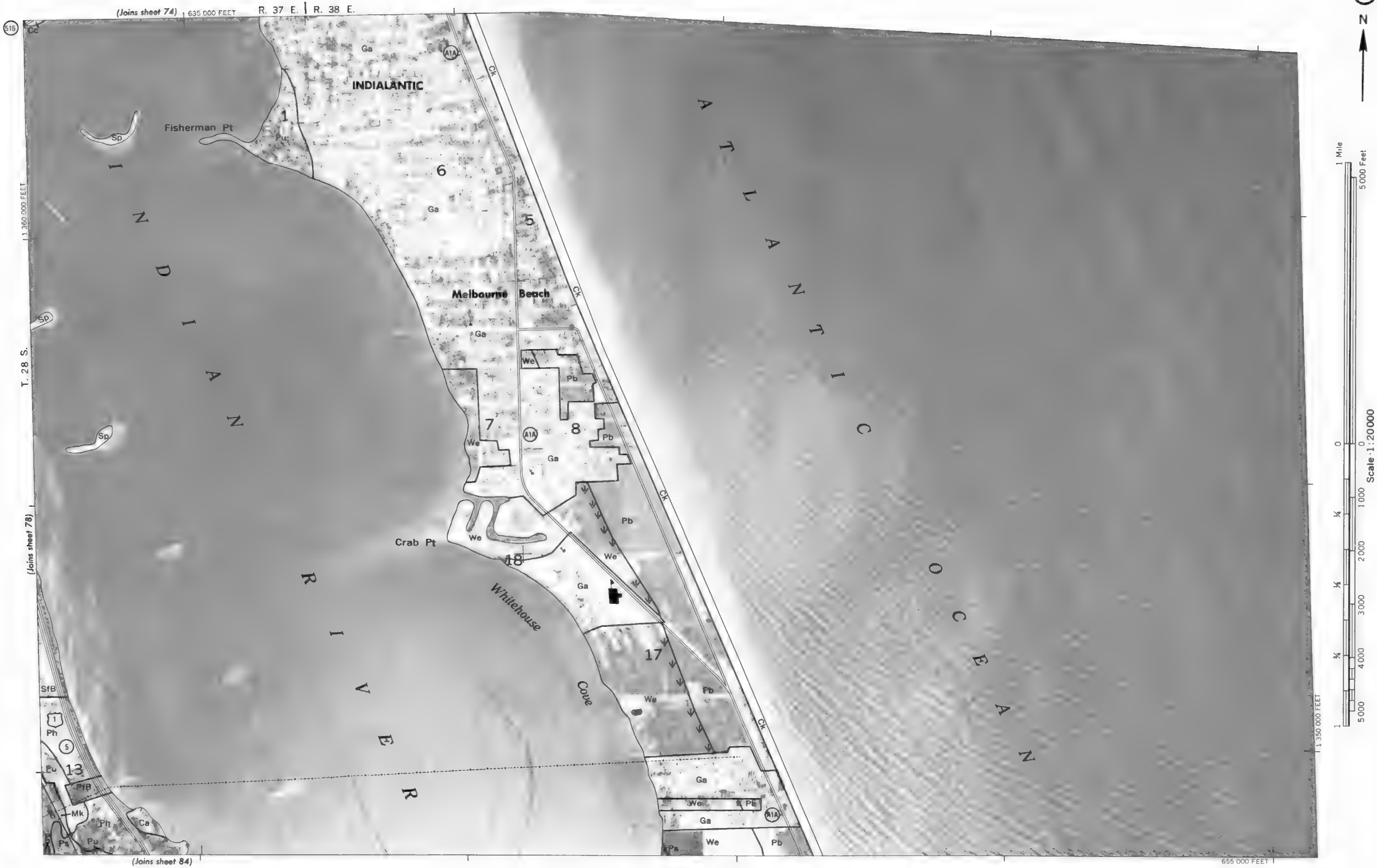


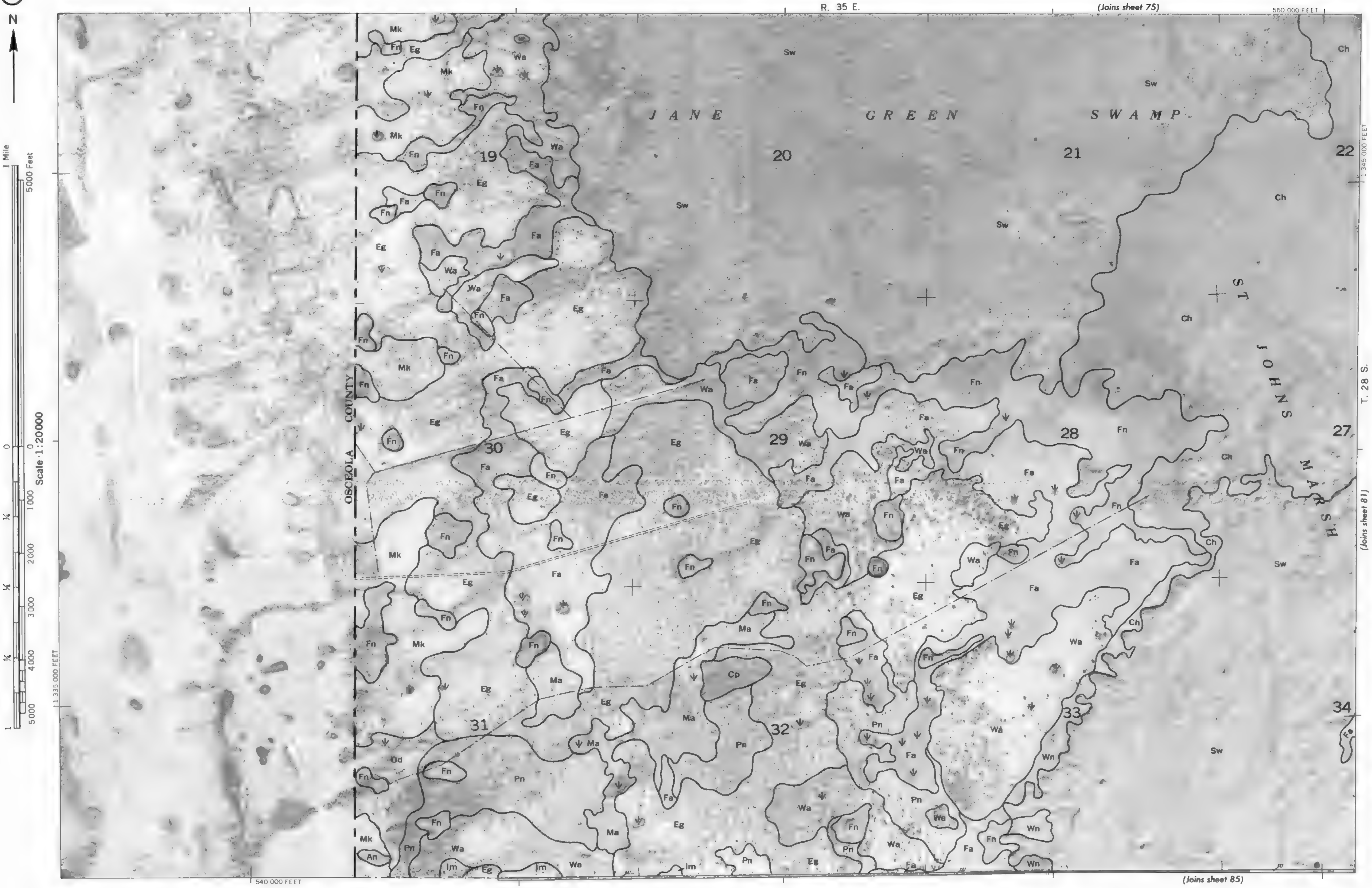
75
N
R. 35 E.
540 000 FEET
560 000 FEET
1 350 000 FEET
T 28 S.
(Joins sheet 70)
(71)
(Joins sheet 76)
(Joins sheet 80)
OSCEOLA COUNTY
Jane Green Creek
Puzzle Lake
JANE GREEN SWAMP
Scale 1:20000
1 Mile
5000 Feet

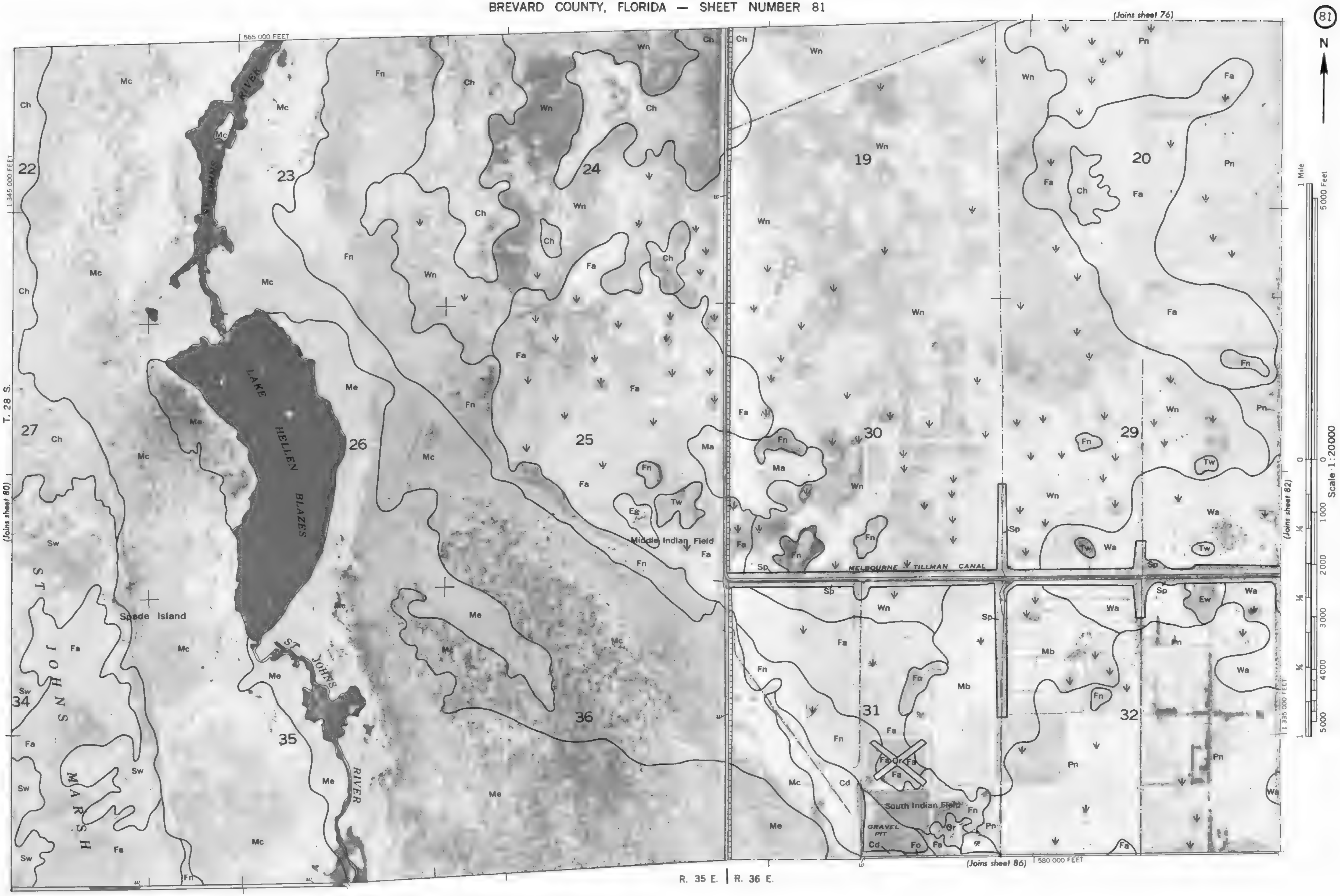

(Joins sheet 71)
R. 35 E. | R. 36 E.
580 000 FEET
N
1 Mile
5 000 Feet
Scale 1:20000
(Joins sheet 75)
(Joins sheet 77)
(Joins sheet 81)
565 000 FEET
1 360 000 FEET
1 350 000 FEET
T. 28 S.
SAWGRASS LAKE
Little Sawgrass Lake
ST JOHNS RIVER
North Indian Field
GAS
192
500
Pn
Wa
Fn
Fa
Ch
Mc
Me
Mk
An
Eg
Sb
Tw
Ew
Sw
Wn
Qr
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18

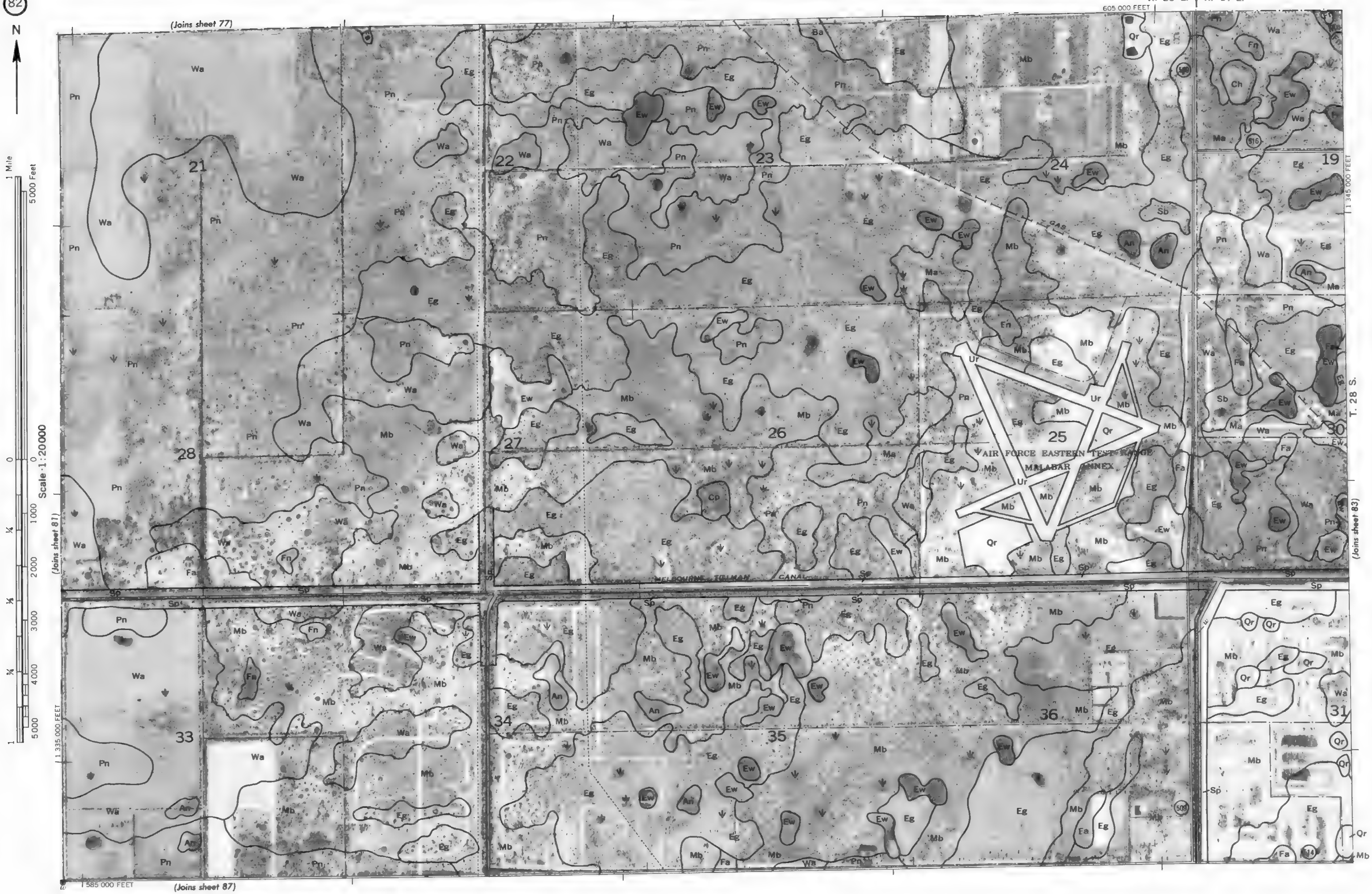

77
N
(Joins sheet 72)
R. 36 E.
R. 37 E.
585 000 FEET
1 360 000 FEET
T. 28 S.
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 82)
605 000 FEET
1 350 000 FEET
GRAVEL PIT
Mintons Corner
water
GAS
Scale 1:20000
1 Mile
5000 Feet

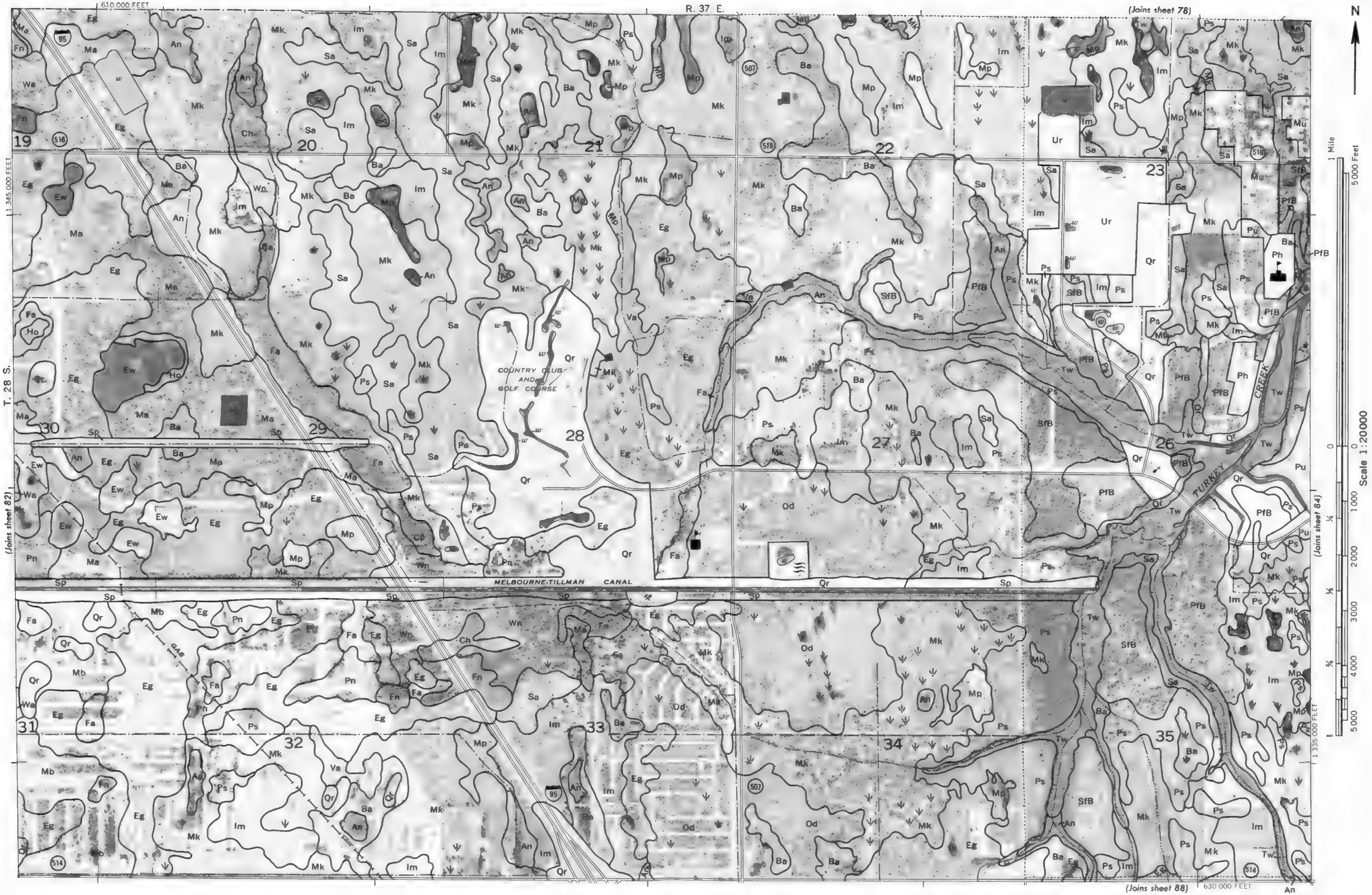

N
(Joins sheet 73)
R. 37 E.
630 000 FEET
MELBOURNE
WEST MELBOURNE
MELBOURNE GOLF COURSE AND COUNTRY CLUB
Crane Creek
INDIAN RIVER
FLORIDA EAST COAST
Fla Inst Tech
T. 28 S.
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 83)
610 000 FEET
1 380 000 FEET
1 360 000 FEET
Scale 1:20000
1 Mile
5000 Feet


79
N
(Joins sheet 74)
635 000 FEET
R. 37 E.
R. 38 E.
INDIALANTIC
Fisherman Pt
Melbourne Beach
Crab Pt
Whitehouse
Cove
INDIAN RIVER
ATLANTIC OCEAN
T. 28 S.
1 360 000 FEET
1 350 000 FEET
(Joins sheet 78)
(Joins sheet 84)
655 000 FEET
Scale 1:20000
1 Mile
5000 Feet
Ga
Pu
Sp
We
Pb
Ck
SfB
Ph
PfB
Mk
Ca
Ps
Cc
1
5
6
7
8
13
17
18

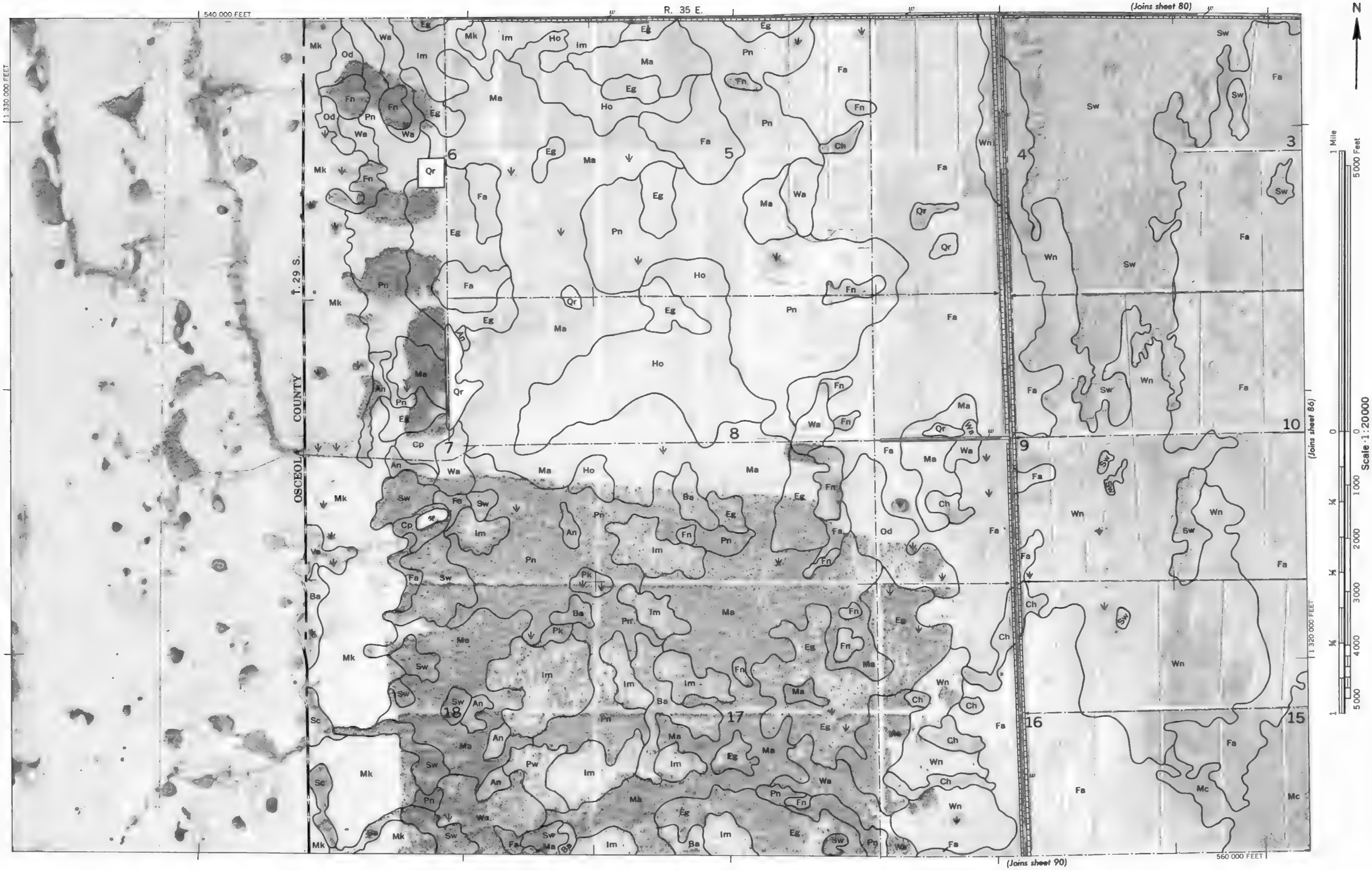

N
R. 35 E.
(Joins sheet 75)
(Joins sheet 81)
(Joins sheet 85)
560 000 FEET
540 000 FEET
1 345 000 FEET
1 335 000 FEET
T. 28 S.
OSCEOLA COUNTY
JANE GREEN SWAMP
ST JOHNS MARSH
Scale 1:20000
1 Mile
5000 Feet
19
20
21
22
27
28
29
30
31
32
33
34

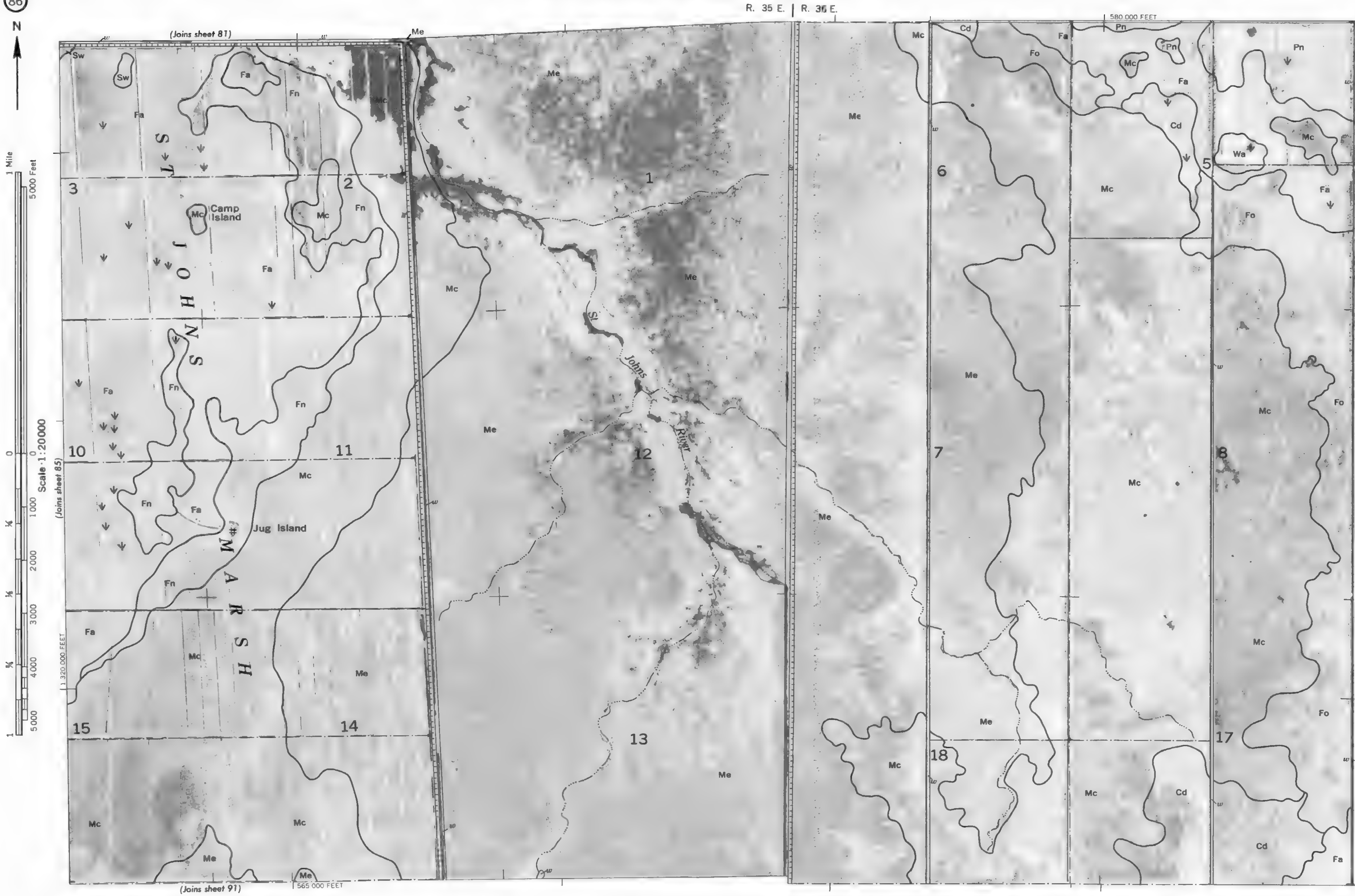

81
N
(Joins sheet 76)
(Joins sheet 80)
(Joins sheet 82)
(Joins sheet 86)
565 000 FEET
580 000 FEET
1 345 000 FEET
1 335 000 FEET
T. 28 S.
R. 35 E. | R. 36 E.
LAKE HELLEN BLAZES
ST JOHNS RIVER
ST JOHNS MARSH
Spade Island
Middle Indian Field
South Indian Field
GRAVEL PIT
MELBOURNE TILLMAN CANAL
22
23
24
25
26
27
34
35
36
19
20
29
30
31
32
1 Mile
5000 Feet
Scale 1:20000


82
N
(Joins sheet 77)
(Joins sheet 81)
(Joins sheet 83)
(Joins sheet 87)
R. 36 E.
R. 37 E.
T. 28 S.
605 000 FEET
585 000 FEET
1 345 000 FEET
1 335 000 FEET
Scale 1:20000
1 Mile
5000 Feet
AIR FORCE EASTERN TEST RANGE
MALABAR ANNEX
MELBOURNE - TILLMAN CANAL
GAS
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31

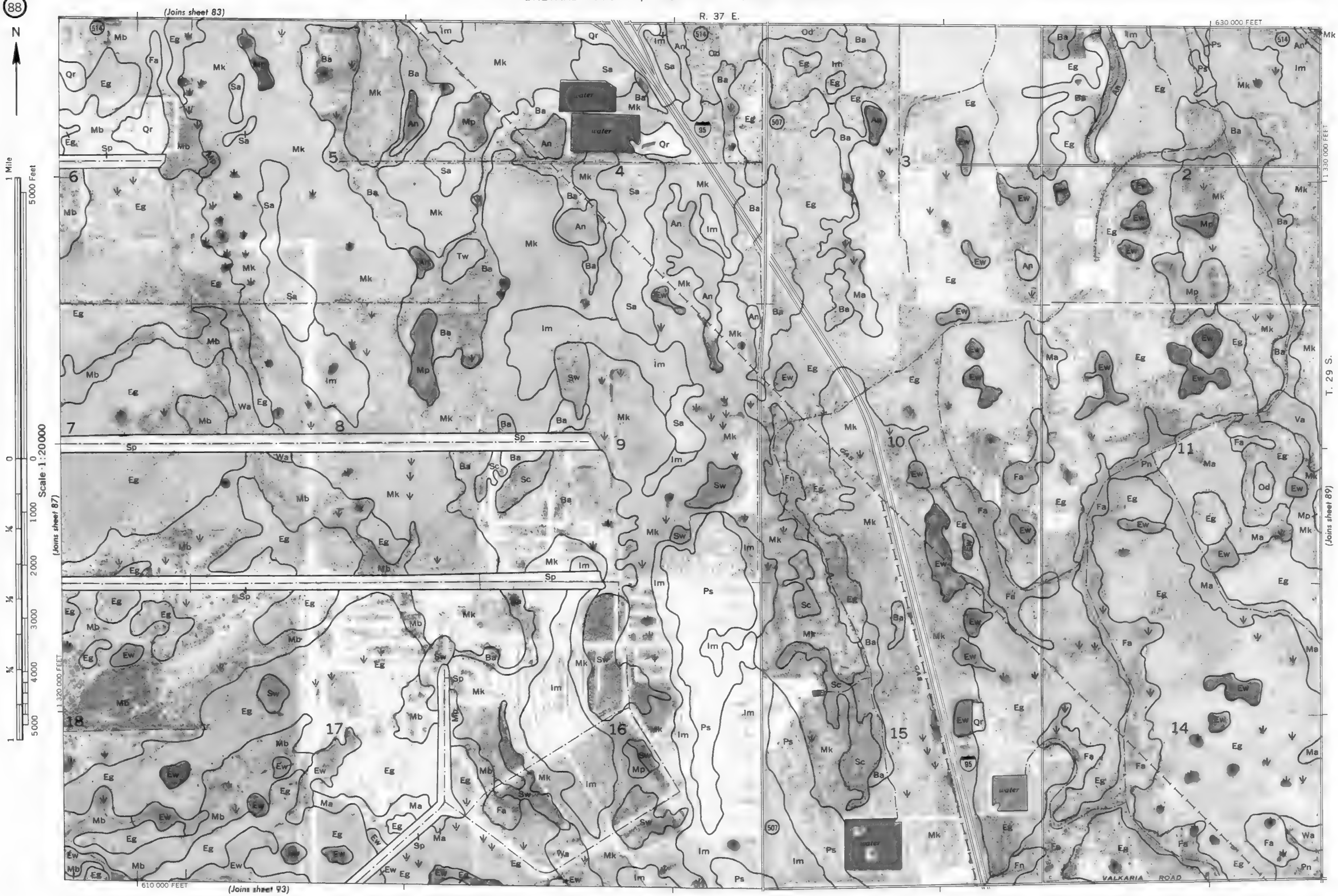

N
610 000 FEET
R. 37 E.
(Joins sheet 78)
1 345 000 FEET
T. 28 S.
(Joins sheet 82)
(Joins sheet 84)
(Joins sheet 88)
630 000 FEET
1 335 000 FEET
COUNTRY CLUB AND GOLF COURSE
MELBOURNE-TILLMAN CANAL
TURKEY CREEK
GAS
95
507
514
516
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000

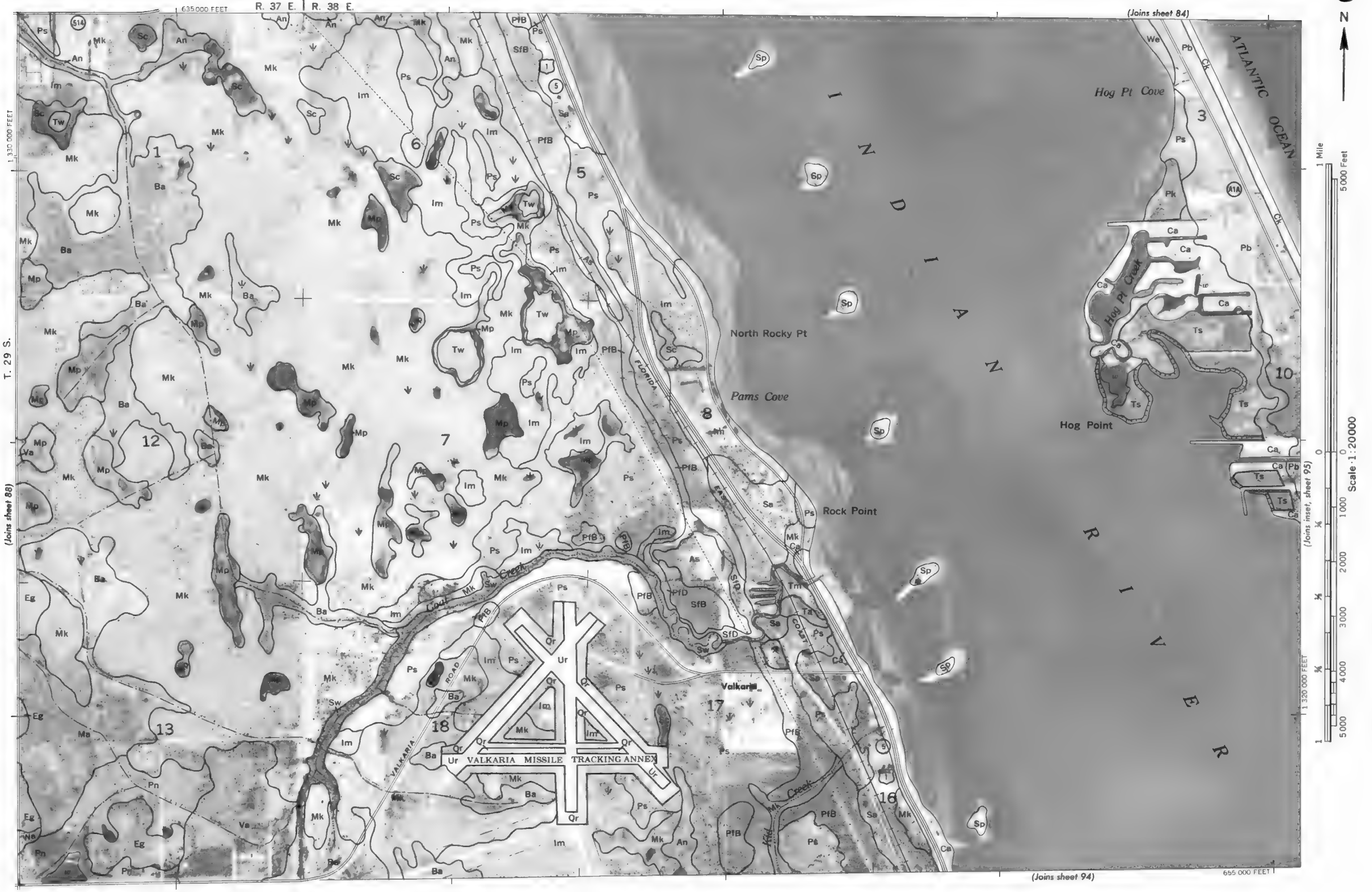

84
N
(Joins sheet 79)
655 000 FEET
1 345 000 FEET
1 335 000 FEET
635 000 FEET
(Joins sheet 83)
(Joins sheet 89)
R. 37 E. | R. 38 E.
T. 28 S.
1 Mile
5000 Feet
Scale 1:20000
Castaway Pt
Long Sandy Pt
Palm Bay
PALM BAY
Bluefish Pt
Carters Bulkhead
Mosier Hammock
TURKEY CREEK
FLORIDA EAST COAST
GRAVEL PIT
Cape Malabar
Coconut Pt
Malabar
INDIAN RIVER
ATLANTIC OCEAN
20
21
24
25
28
30
31
33
34
36
A1A
1
5
514

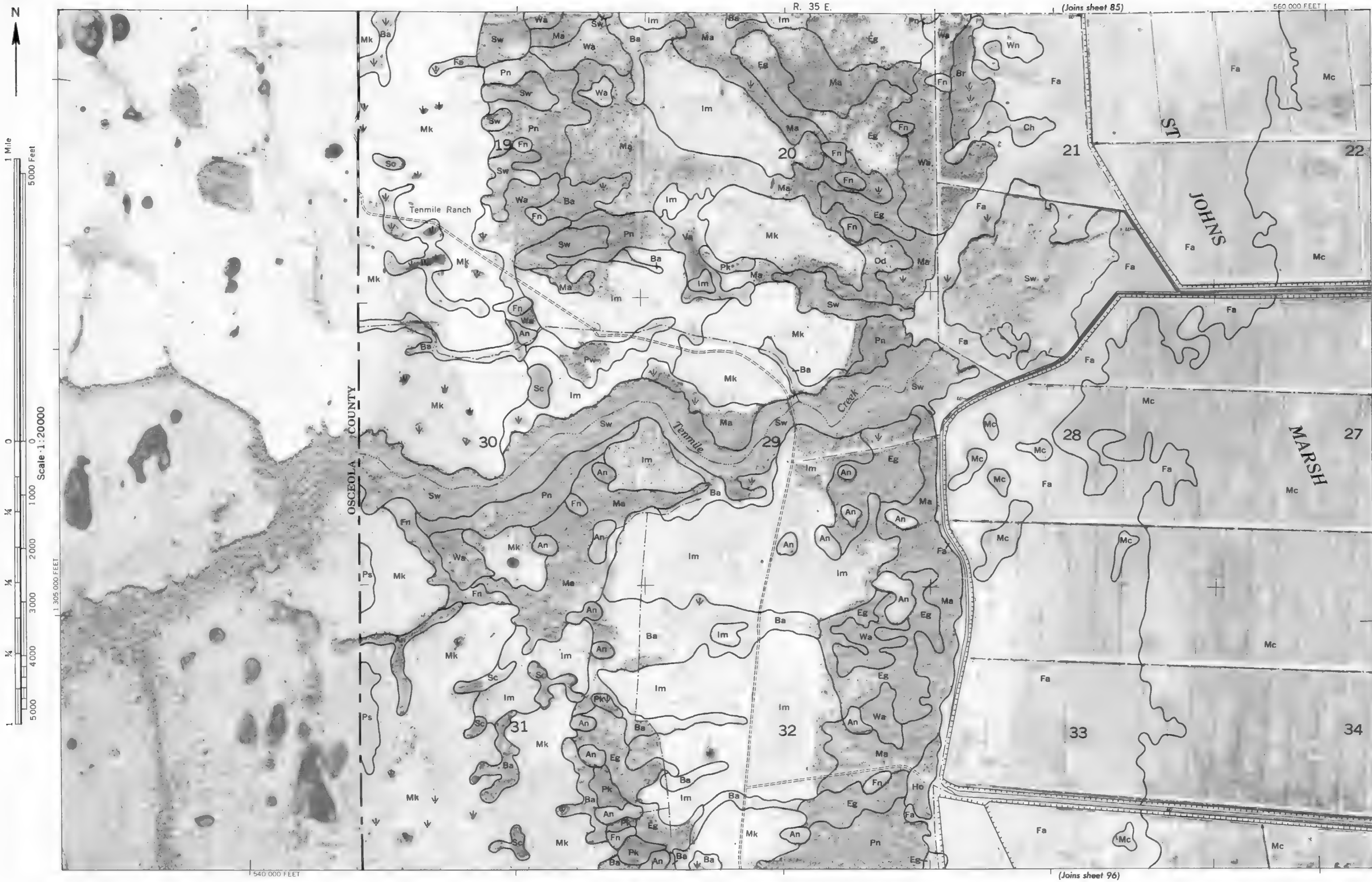

540 000 FEET
R. 35 E.
(Joins sheet 80)
1 330 000 FEET
T. 29 S.
OSCEOLA COUNTY
(Joins sheet 86)
1 320 000 FEET
(Joins sheet 90)
560 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
3
4
5
6
7
8
9
10
15
16
17
18

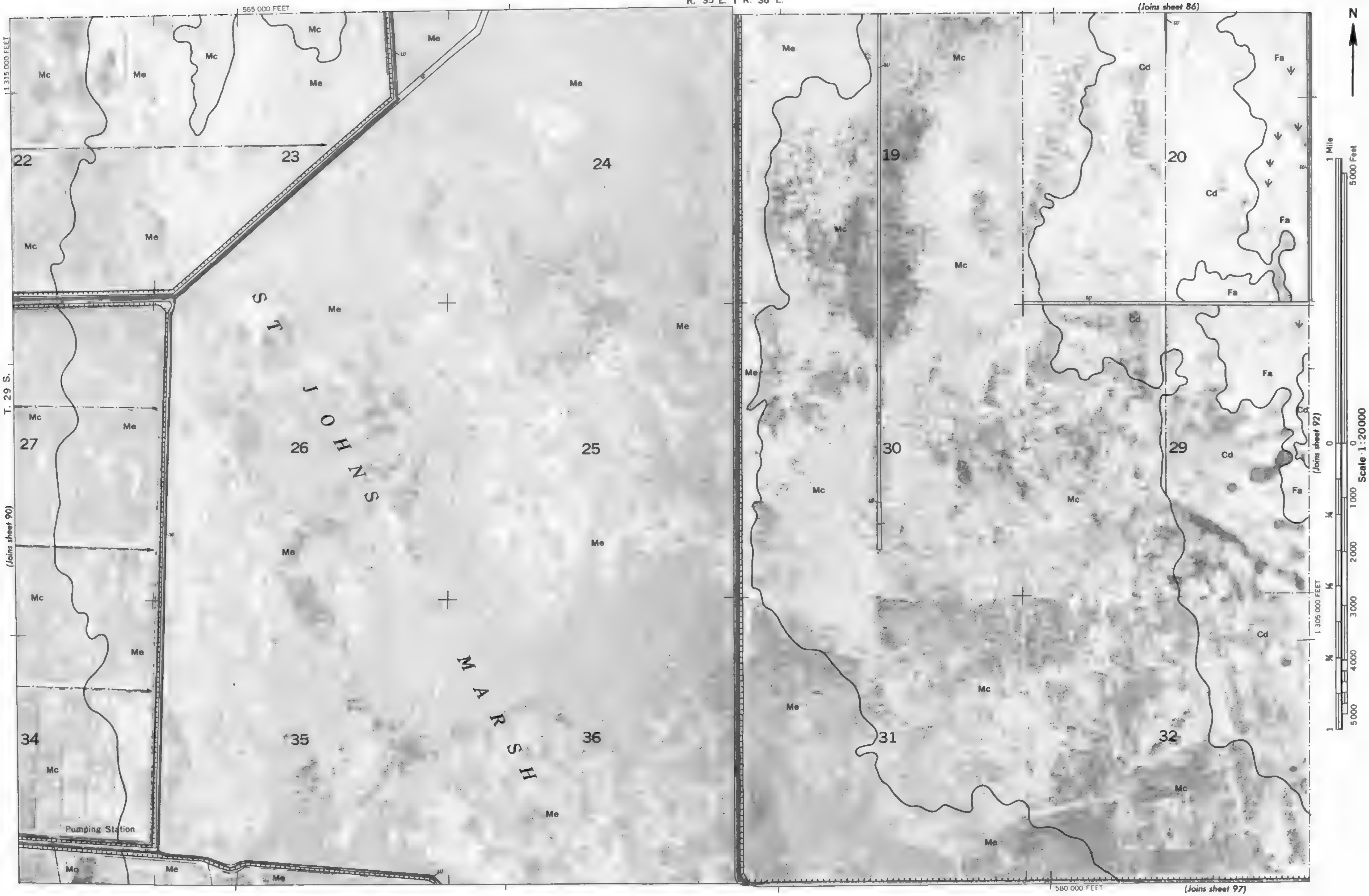

R. 35 E.
R. 36 E.
N
(Joins sheet 81)
580 000 FEET
1 330 000 FEET
(Joins sheet 85)
(Joins sheet 87)
(Joins sheet 91)
565 000 FEET
1 320 000 FEET
T. 29 S.
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
Camp Island
Jug Island
ST JOHNS MARSH
St. Johns River
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
Sw
Fa
Fn
Mc
Me
Cd
Fo
Pn
Wa


87
N
(Joins sheet 82)
R. 36 E.
R. 37 E.
585 000 FEET
1 330 000 FEET
T. 29 S.
(Joins sheet 86)
(Joins sheet 88)
(Joins sheet 92)
605 000 FEET
1 320 000 FEET
Scale 1:20000
1 Mile
5000 Feet
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18

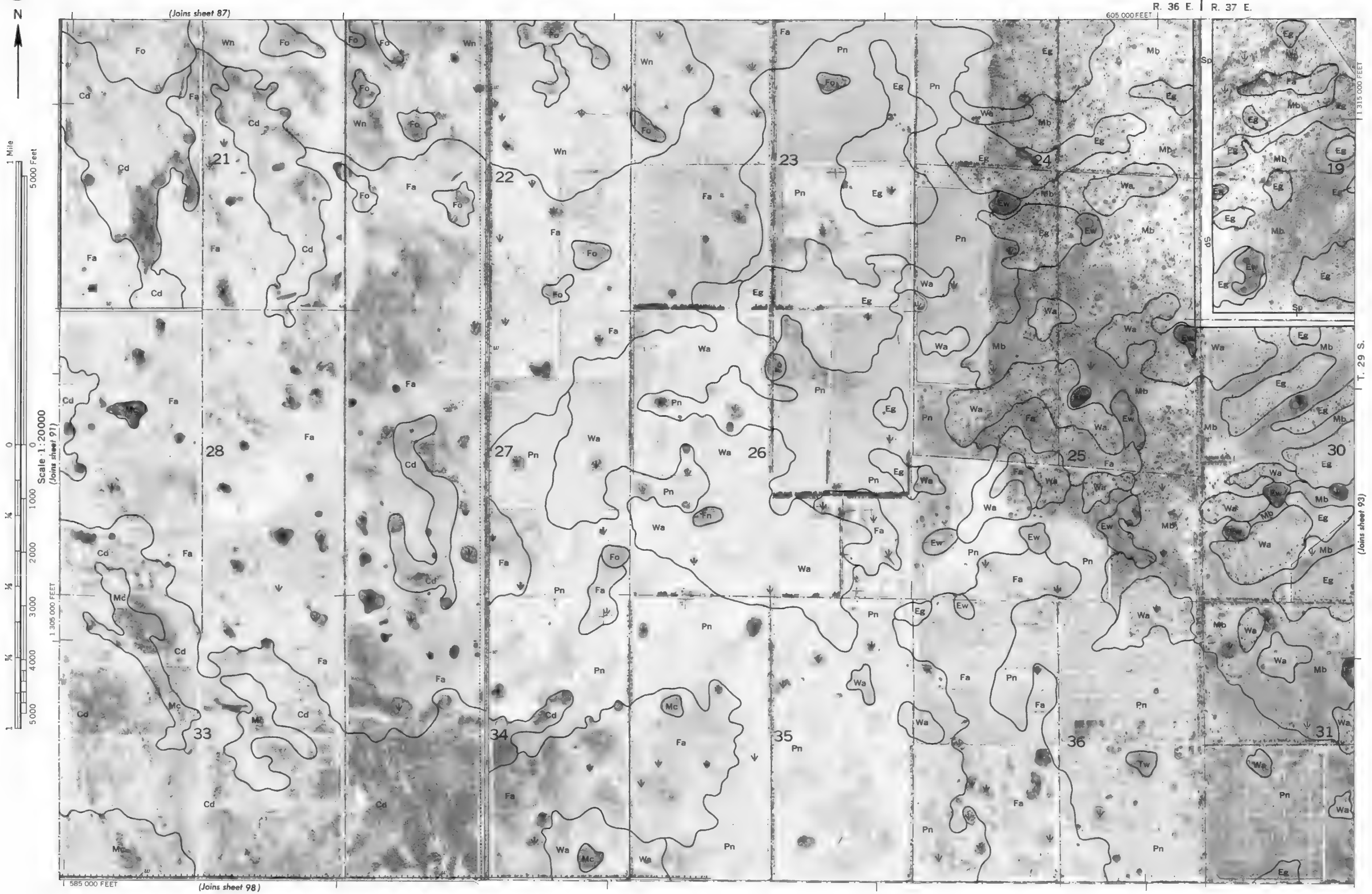

88
N
(Joins sheet 83)
R. 37 E.
630 000 FEET
1 330 000 FEET
T. 29 S.
(Joins sheet 89)
(Joins sheet 87)
1 320 000 FEET
610 000 FEET
(Joins sheet 93)
VALKARIA ROAD
Scale 1:20000
1 Mile
5000 Feet
water


N
635 000 FEET
R. 37 E. | R. 38 E.
(Joins sheet 84)
(Joins sheet 88)
(Joins sheet 94)
(Joins inset, sheet 95)
655 000 FEET
1 330 000 FEET
1 320 000 FEET
T. 29 S.
INDIAN RIVER
ATLANTIC OCEAN
Hog Pt Cove
Hog Pt Creek
Hog Point
North Rocky Pt
Pams Cove
Rock Point
Valkaria
VALKARIA MISSILE TRACKING ANNEX
Coal Mk Sw Creek
Kid Mk Creek
FLORIDA EAST COAST
VALKARIA ROAD
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000

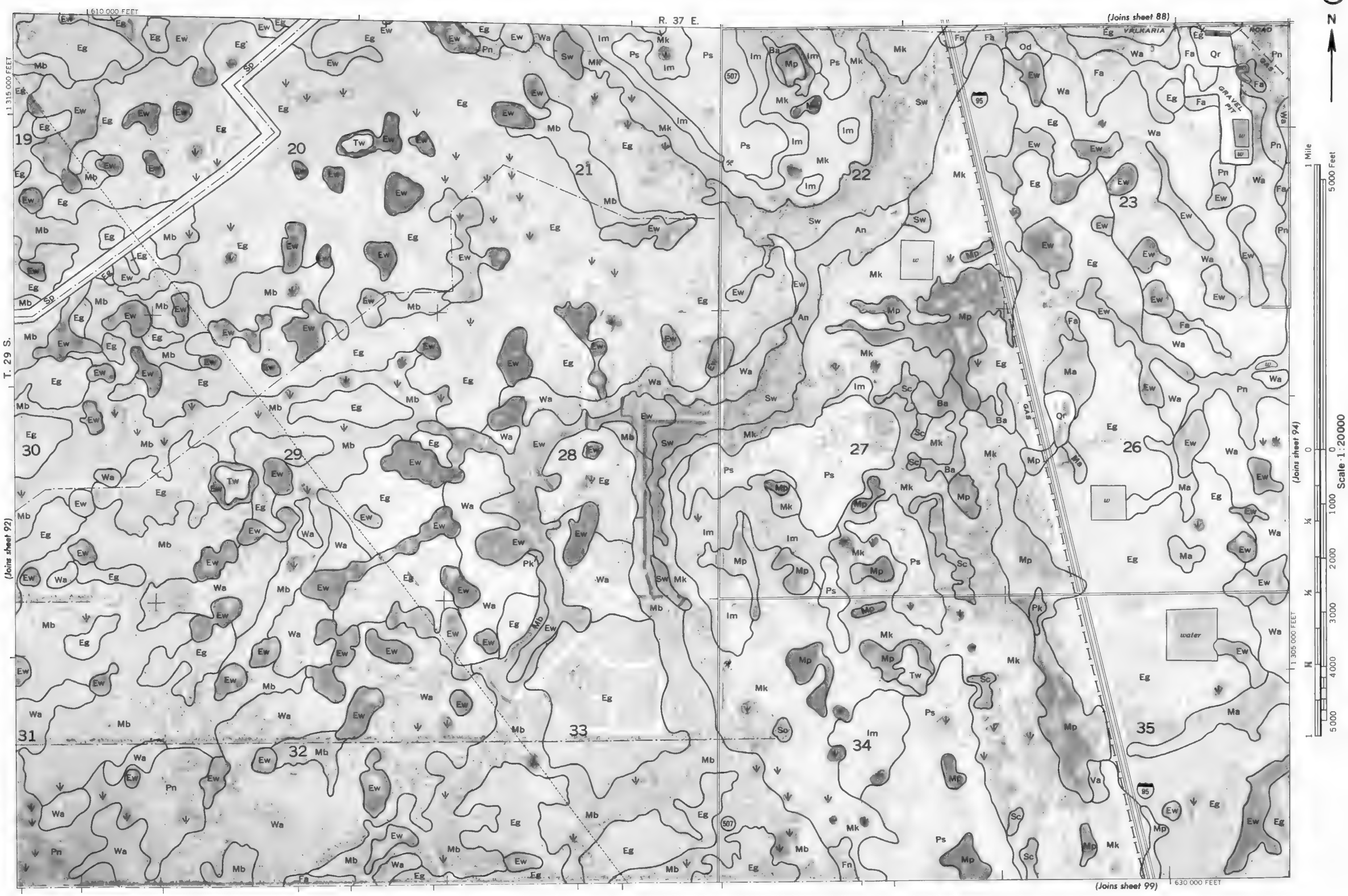

N
1 Mile
5000 Feet
Scale 1:20 000
0
1000
2000
3000
4000
5000
R. 35 E.
(Joins sheet 85)
560 000 FEET
1 315 000 FEET
T. 29 S.
(Joins sheet 91)
(Joins sheet 96)
540 000 FEET
1 305 000 FEET
OSCEOLA COUNTY
Tenmile Ranch
Tenmile
Creek
ST JOHNS MARSH
19
20
21
22
30
29
28
27
31
32
33
34


R. 35 E.
R. 36 E.
565 000 FEET
1 315 000 FEET
(Joins sheet 86)
(Joins sheet 90)
(Joins sheet 92)
(Joins sheet 97)
580 000 FEET
1 305 000 FEET
T. 29 S.
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
ST JOHNS MARSH
Pumping Station
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
Mc
Me
Cd
Fa

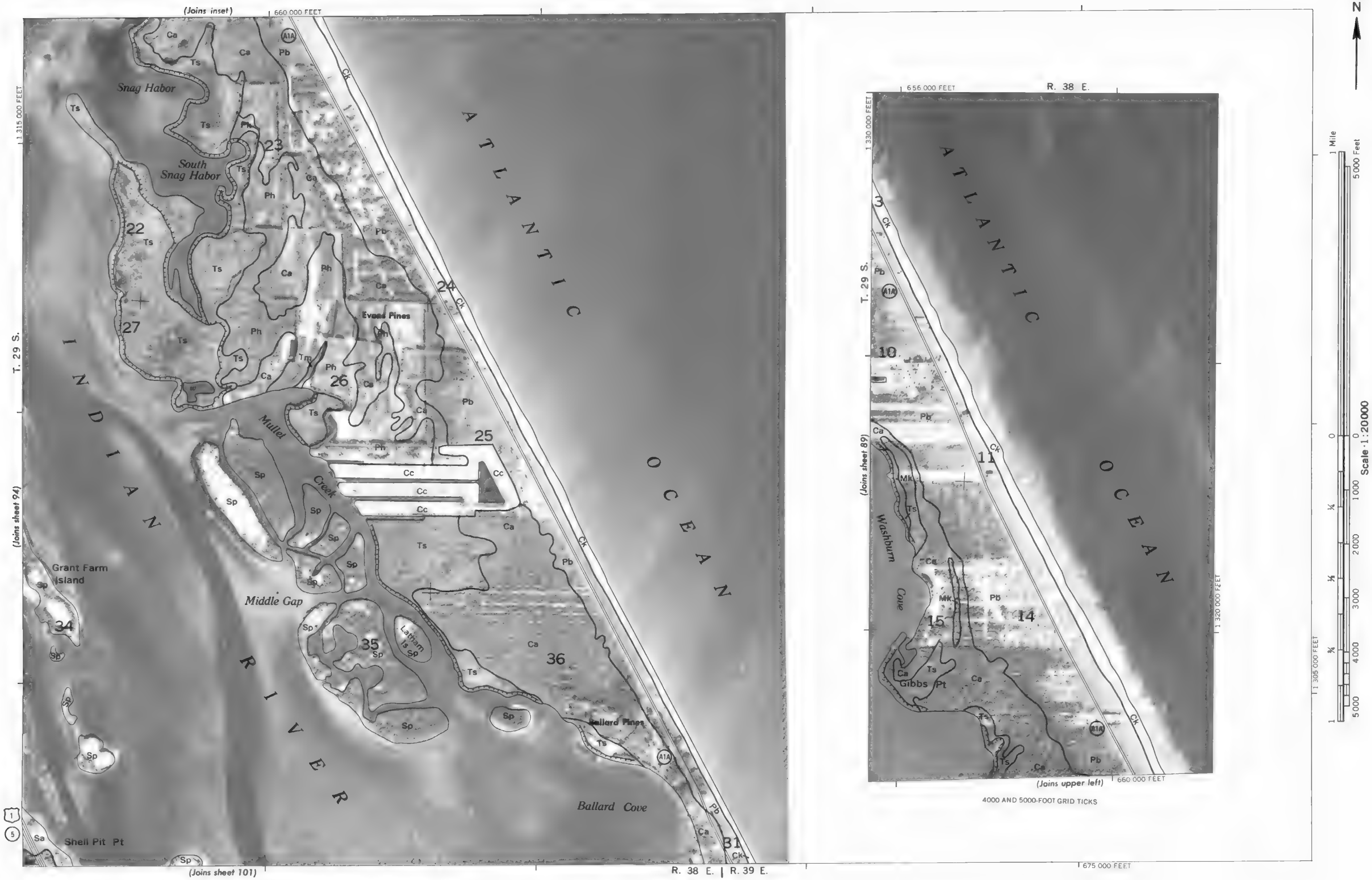
BREVARD COUNTY, FLORIDA — SHEET NUMBER 92

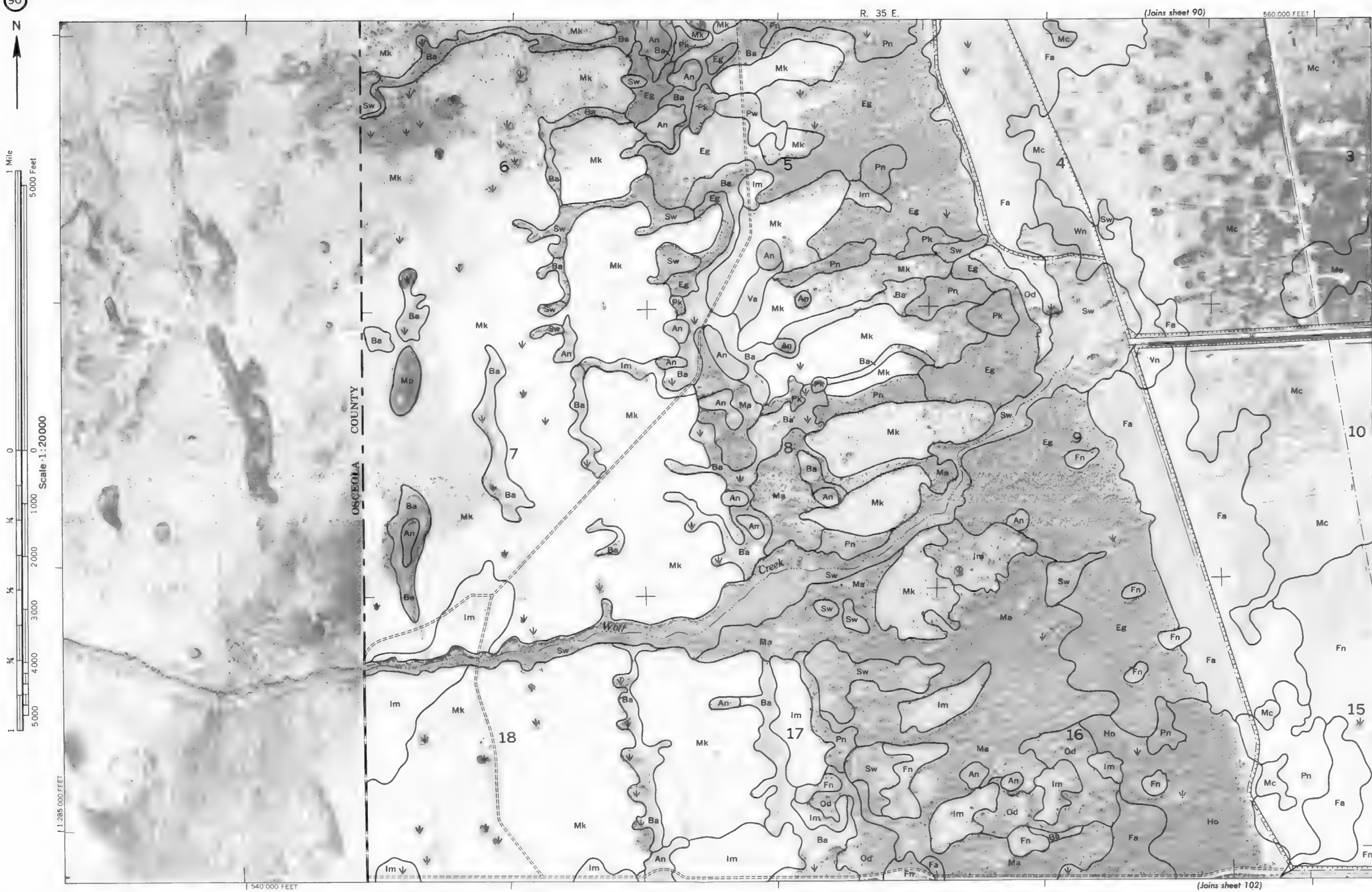


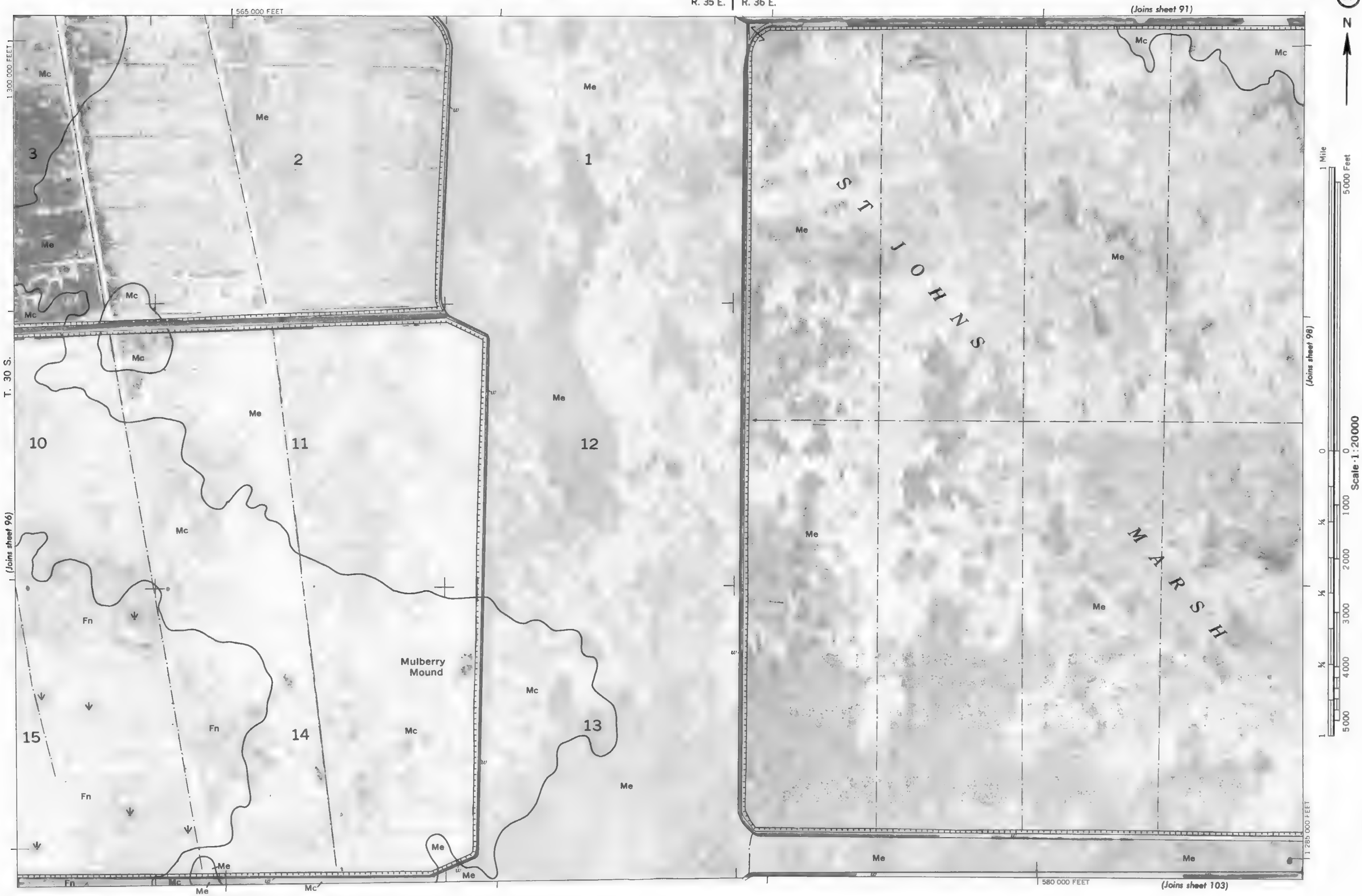
BREVARD COUNTY, FLORIDA — SHEET NUMBER 93

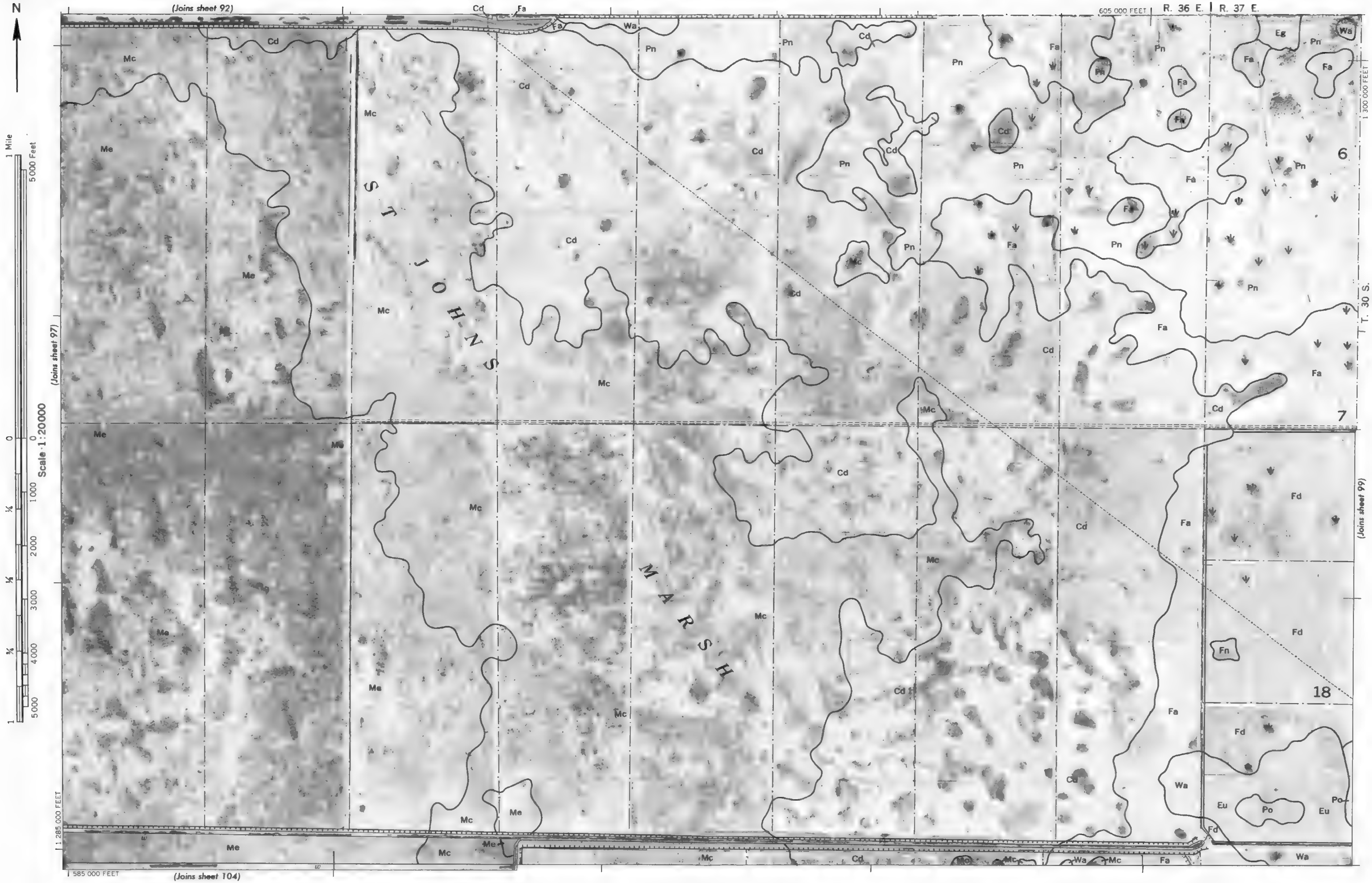


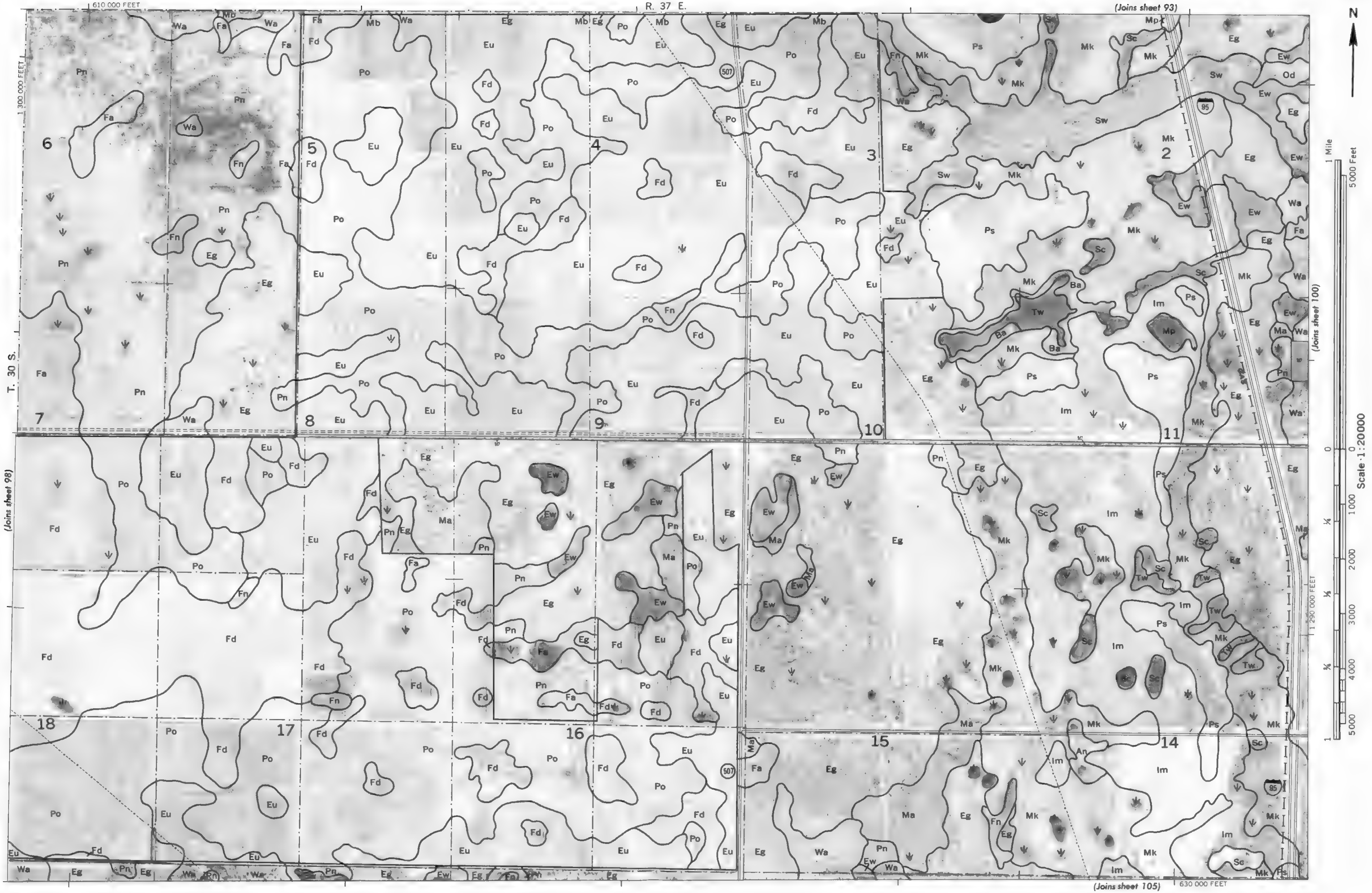

N
(Joins sheet 89)
R. 37 E. | R. 38 E.
655 000 FEET
VALKARIA ROAD
GRAVEL PIT
INDIAN RIVER
1 315 000 FEET
T. 29 S.
Grant
Grant Farm Island
(Joins sheet 95)
(Joins sheet 93)
1 305 000 FEET
(Joins sheet 100)
635 000 FEET
Trout Creek
EAST COAST
GAS
24
19
20
21
25
30
29
28
27
36
31
32
33
34
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1
0
1000
2000
3000
4000
5000

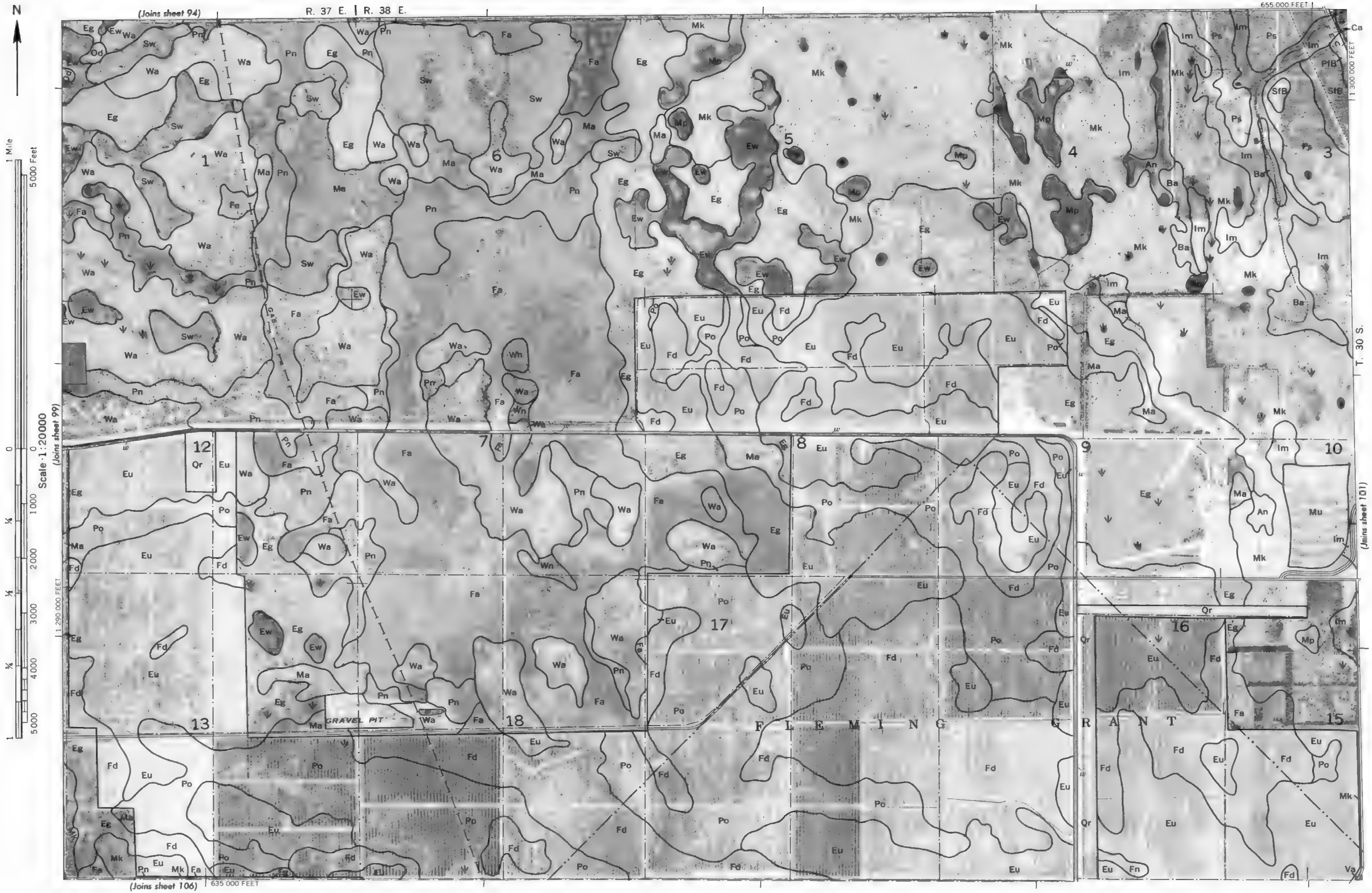

(Joins inset)
660 000 FEET
1 315 000 FEET
T. 29 S.
(Joins sheet 94)
(Joins sheet 101)
R. 38 E. | R. 39 E.
ATLANTIC OCEAN
INDIAN RIVER
Snag Habor
South Snag Habor
Evans Pines
Mullet Creek
Grant Farm Island
Middle Gap
Latham Is
Ballard Pines
Ballard Cove
Shell Pit Pt
656 000 FEET
R. 38 E.
1 330 000 FEET
(Joins sheet 89)
Washburn Cove
Gibbs Pt
1 320 000 FEET
(Joins upper left)
4000 AND 5000-FOOT GRID TICKS
1 305 000 FEET
675 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000

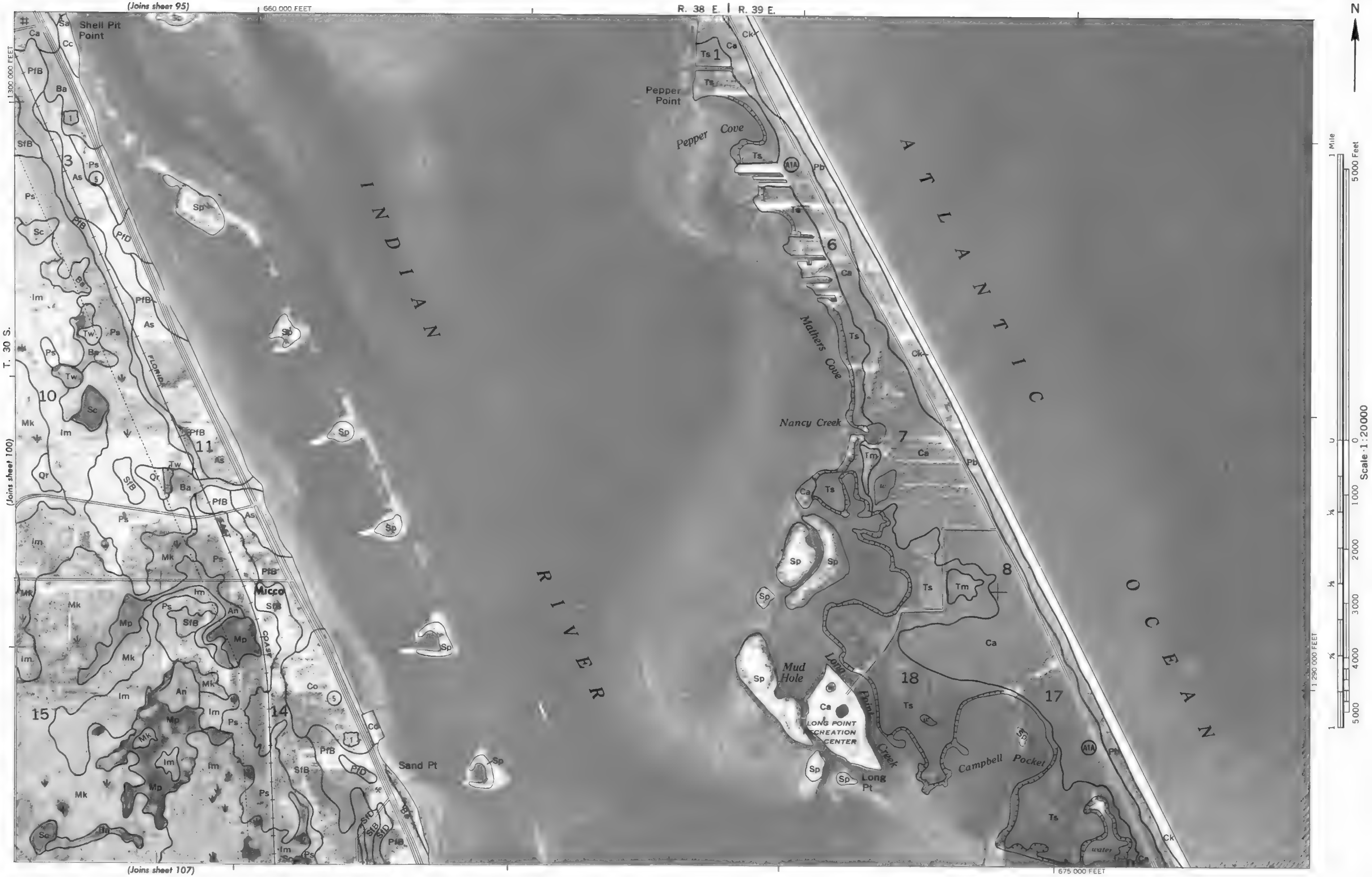

N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
R. 35 E.
(Joins sheet 90)
560 000 FEET
1 300 000 FEET
T. 30 S.
(Joins sheet 97)
(Joins sheet 102)
540 000 FEET
1 285 000 FEET
OSCEOLA COUNTY
Wolf Creek
3
4
5
6
7
8
9
10
15
16
17
18


R. 35 E.
R. 36 E.
565 000 FEET
(Joins sheet 91)
1 300 000 FEET
T. 30 S.
(Joins sheet 96)
(Joins sheet 98)
(Joins sheet 103)
580 000 FEET
1 285 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
Mc
Me
Fn
w
1
2
3
10
11
12
13
14
15
ST JOHNS
MARSH
Mulberry
Mound

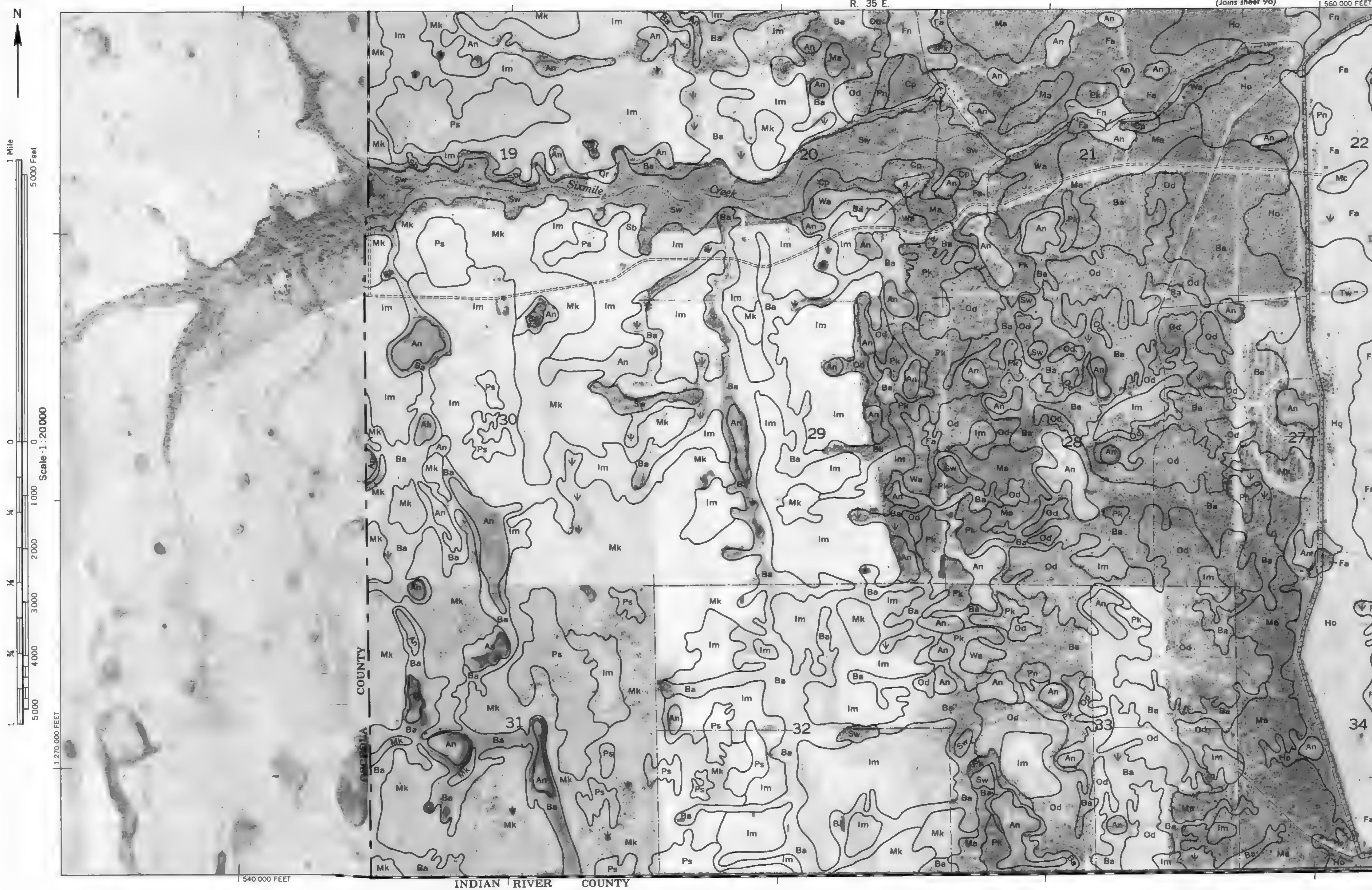

N
(Joins sheet 92)
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 104)
R. 36 E.
R. 37 E.
T. 30 S.
605 000 FEET
1 300 000 FEET
1 285 000 FEET
585 000 FEET
ST JOHNS MARSH
Scale 1:20000
1 Mile
5000 Feet
6
7
18
Cd
Fa
Wa
Pn
Mc
Me
Eg
Fd
Fn
Eu
Po
Mo


610 000 FEET
R. 37 E.
(Joins sheet 93)
N
1 300 000 FEET
T. 30 S.
(Joins sheet 98)
(Joins sheet 100)
1 290 000 FEET
(Joins sheet 105)
630 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
6
5
4
3
2
7
8
9
10
11
18
17
16
15
14
507
95

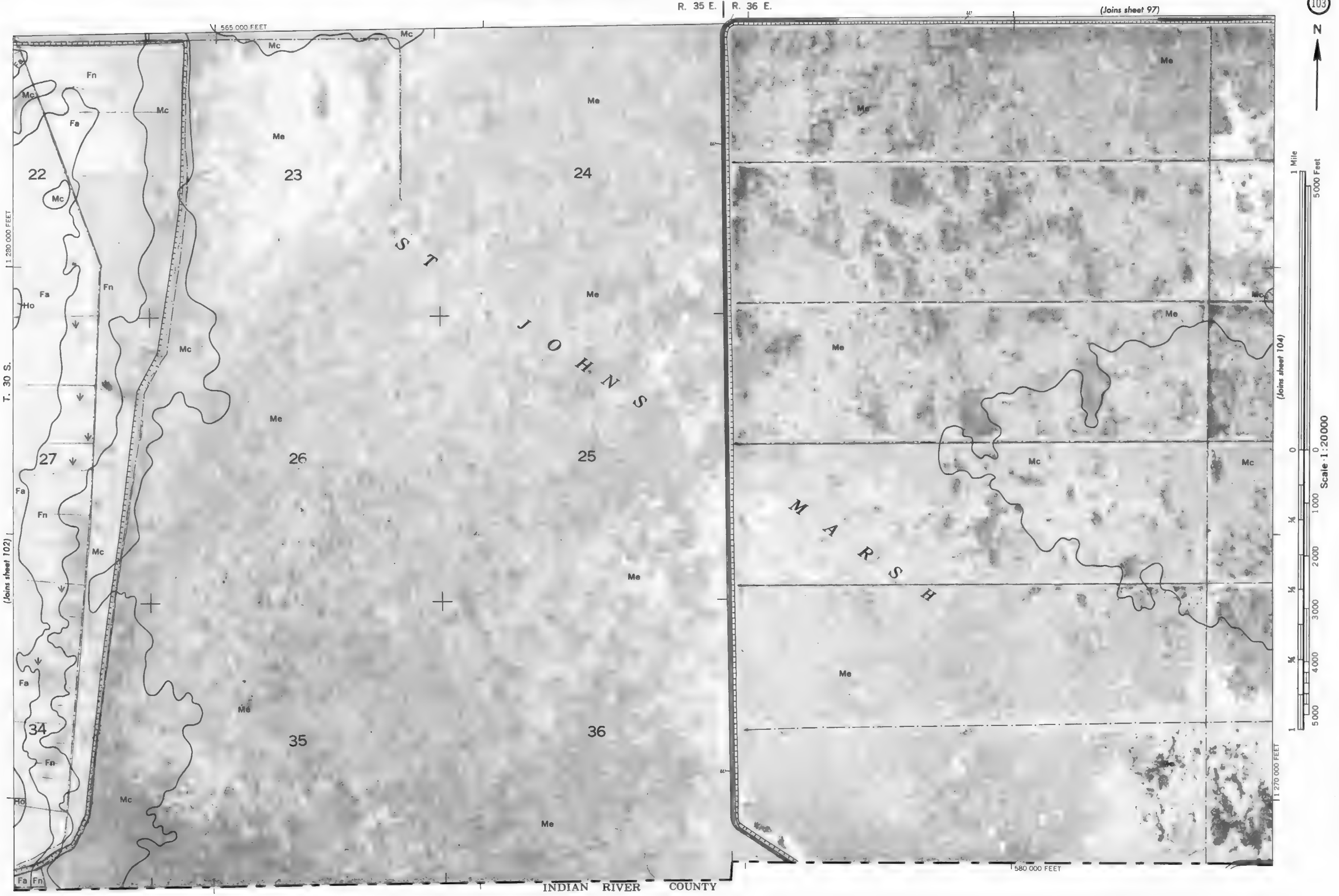

N
(Joins sheet 94)
R. 37 E.
R. 38 E.
655 000 FEET
1 300 000 FEET
T. 30 S.
(Joins sheet 101)
(Joins sheet 99)
(Joins sheet 106)
635 000 FEET
1 290 000 FEET
1 Mile
5000 Feet
Scale 1:20000
GRAVEL PIT
F L E M I N G G R A N T

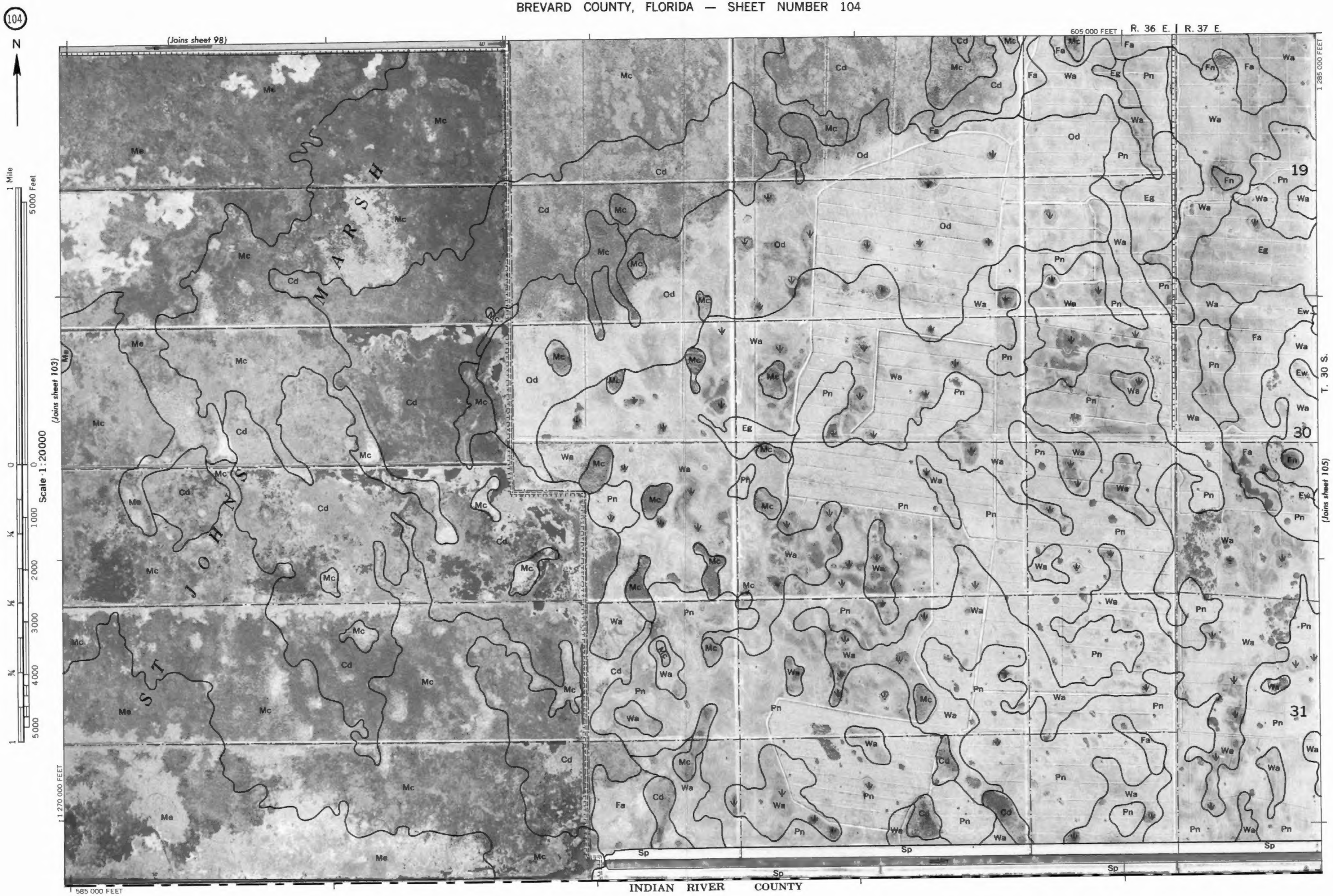

(Joins sheet 95)
(Joins sheet 100)
(Joins sheet 107)
660 000 FEET
675 000 FEET
1 300 000 FEET
1 290 000 FEET
R. 38 E. | R. 39 E.
T. 30 S.
N
Scale 1:20000
1 Mile
5000 Feet
INDIAN RIVER
ATLANTIC OCEAN
Shell Pit Point
Pepper Point
Pepper Cove
Mathers Cove
Nancy Creek
Mud Hole
Long Point Creek
LONG POINT RECREATION CENTER
Long Pt
Campbell Pocket
Sand Pt
Micco

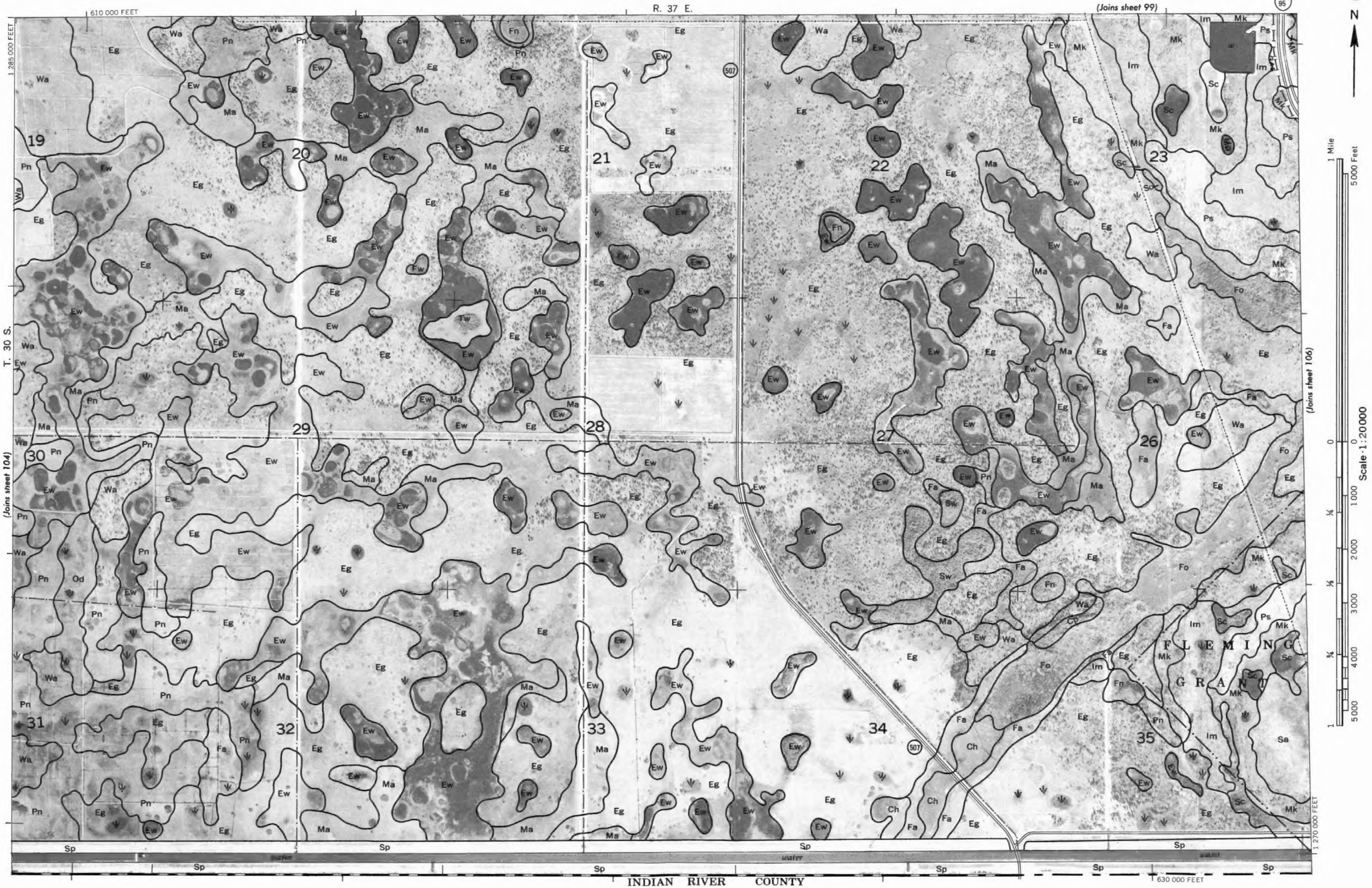
BREVARD COUNTY, FLORIDA — SHEET NUMBER 102



BREVARD COUNTY, FLORIDA — SHEET NUMBER 103

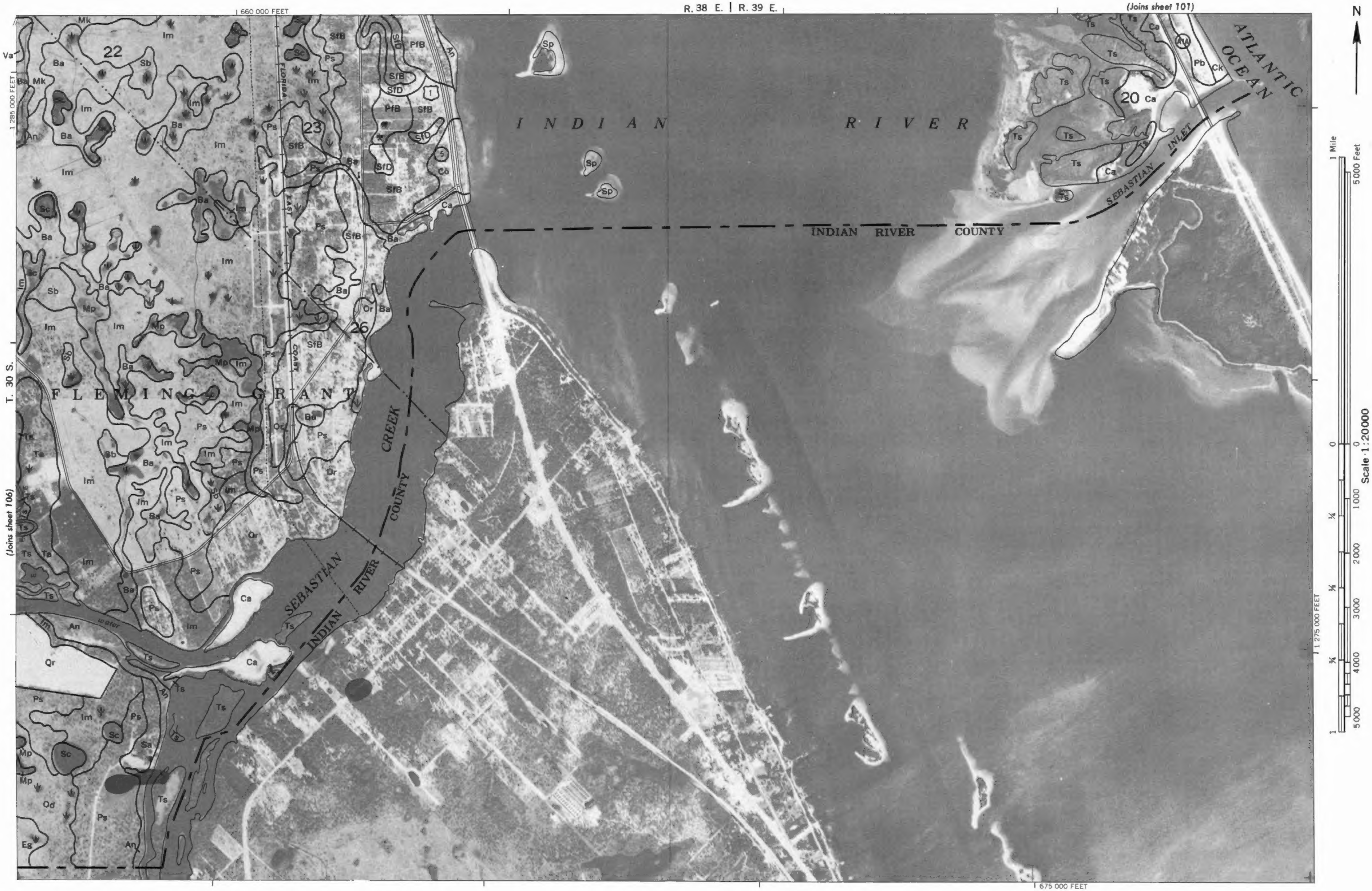



104
N
(Joins sheet 98)
(Joins sheet 103)
(Joins sheet 105)
605 000 FEET
R. 36 E.
R. 37 E.
1 285 000 FEET
T. 30 S.
1 270 000 FEET
585 000 FEET
ST JOHNS MARSH
INDIAN RIVER COUNTY
19
30
31
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Mc
Me
Cd
Od
Wa
Pn
Fa
Fn
Eg
Ew
Sp



610 000 FEET
R. 37 E.
(Joins sheet 99)
1 285 000 FEET
T. 30 S.
(Joins sheet 104)
(Joins sheet 106)
N
1 Mile
5000 Feet
Scale 1:20000
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
FLEMING GRANT
INDIAN RIVER COUNTY
1 270 000 FEET
630 000 FEET


N
(Joins sheet 100)
R. 37 E.
R. 38 E.
655 000 FEET
1 285 000 FEET
(Joins sheet 105)
(Joins sheet 107)
T. 30 S.
F L E M I N G G R A N T
FISH HATCHERY
North Prong Sebastian Creek
Scale 1:20000
1 Mile
5000 Feet
1 270 000 FEET
635 000 FEET
INDIAN RIVER COUNTY


660 000 FEET
R. 38 E. | R. 39 E.
(Joins sheet 101)
N
1 285 000 FEET
T. 30 S.
(Joins sheet 106)
I N D I A N R I V E R
ATLANTIC OCEAN
SEBASTIAN INLET
INDIAN RIVER COUNTY
FLEMING GRANT
CREEK
SEBASTIAN
INDIAN RIVER
COUNTY
FLORIDA EAST COAST
22
23
26
20
1 275 000 FEET
675 000 FEET
1 Mile
5000 Feet
Scale 1:20000